Final Visual Presentation
for the Degree of
Master of Visual Arts

# Evaluation and Development of Safety Symbols

## Evaluation of Safety Symbols, Appropriateness Ranking Tests and Comprehension Recognition Tests

Visual Communication Design

Tony Yau
1986

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled EVALUATION AND DEVELOPMENT OF SAFETY SYMBOLS

submitted by TONY YAU

in partial fulfilment of the requirements for the degree of Master of VISUAL ARTS

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# EVALUATION AND DEVELOPMENT OF SAFETY SYMBOLS

by

TONY C.H. YAU

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF VISUAL ARTS IN VISUAL COMMUNICATION DESIGN

DEPARTMENT OF ART AND DESIGN

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| 12 | Draft proposal: hard hat required | " | " | " |
| 13 | Draft proposal: high voltage | " | " | " |
| 14 | Draft proposal: no open flame | " | " | " |

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Master of Visual Arts Thesis
Part II

# Evaluation of Safety Symbols, Appropriateness Ranking Tests and Comprehension Recognition Tests

Tony Yau
Thesis Supervisor: Prof. Jorge Frascara

Visual Communication Design
Department of Art and Design
University of Alberta
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# ABSTRACT

The present research project focuses on the existing signs used in the occupational environment for the communication of regulatory, warning or informational messages relating to safety.

According to the study "An Evaluation of Exit Symbol Visibility" by B. Collins (1983), only five studies have examined some aspects of safety signs such as understandability, attention and compliance with them. We attempt here to develop an experimental study leading to the standardization of graphic symbols for safety.

The present project aims at evaluating the relative performance of existing variants for 16 referents relating to hazards existing in places and equipment accessible to the public.

The study includes: a preliminary survey of existing safety symbols, an Appropriateness Ranking Test and a Comprehension/Recognition Test. Out of a survey of 60 safety-related referents, a selection of 16 was made on the basis of public exposure to the hazard. Following a preliminary screening, variants for 16 referents were coded and reproduced in card form.

Sixty-eight (68) subjects of two countries, Canada and Chile, finished the test according to the procedure set by ISO TC 145. The three best ranked variants of each referent were chosen. The selected variants were reproduced and collated into color coded booklets for the Comprehension/Recognition Test.

One hundred and twenty (120) booklets were sent to each of the seven countries as follows: Canada, Chile, Hong Kong, Hungary, Japan, The Netherlands and Turkey. Four countries (Canada, Hong Kong, Hungary and Japan) completed the test and responses were translated, categorized and tabulated.

Analyzing the data, it was found that the level of comprehension of the symbols tested generally fell at or below the threshold for general acceptance. Seven of the variants met the percentage of comprehension/recognition requirement set out for safety symbols by the ISO.

In view of the present poor result and considering that the symbols tested in this study are currently used around the world, an extensive safety related educational program is recommended to provide essential information to the general public as well as the professionals who more frequently encounter the potential hazards.

Nevertheless, the responses generated from the test provide valuable information in connection with the image-content of a set of safety related messages. High performing variants of six symbols were redesigned in accordance with the principles outlined in ISO TR 7239, and in line with the guideline examples already published in ISO 7001.

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# CHAPTER 1
# INTRODUCTION

Due to the increase of international trade and travel and the growth of work forces which do not share a common language, there is a need to standardize safety information which keeps the use of words to a minimum.

Symbols for universal communication, hazard prevention and machine operation have received much attention during the past two decades.

Early in 1964, an ambitious proposal was made by Margaret Mead for the creation of a system of universally recognized graphic symbols. In 1965, an organization called Glyphs was formed by Rudolf Modley and Margaret Mead for the development of the symbol system. In their article titled "Communication Among All People, Everywhere" (Mead and Modley, 1968), they suggested that in order to break the languages barriers, a universal language should be developed. The suggested development consisted of three steps. The first step was to generate a "set of clear, unambiguous signs that can be understood by the speakers of any language, and by the members of any culture, however primitive (it is)" (Mead et al., 1968, p.57). The second step was the spoken form and the third step was the written form.

Recognizing the importance and practicality of pictorial symbols, another eminent figure in the study of symbols - Henry Dreyfus, in his case study (Dreyfus, 1966), indicated that symbols for industrial use should be able to enhance workers' safety in the work place. In designing symbols for man-machine interface some important design criteria should be incorporated such as consistency of elements, simplicity and clarity of form, and legibility in various sizes.

Edwin Bruening also voiced his concern about the problems arising from the increased amount of foreign trade, specially in the field of technical tools and machinery where "controls and signals lamps [are] identified only by sumbols" (Bruening, 1972, p.59). He pointed out that "in the accident prevention field, work is being done to develop symbols for both immaterial (fumes which are not humanly detectable such as carbon monoxide or biological hazards) and material things" (Ditto, p.59), and was an advocate of efficient symbol communication.

Modley in one of his articles, "Speaking on Sign Language" (1976) continues to advocate scientific study, design implementation and proper education of the public in order to bridge language barriers. In one of his studies, Modley concluded that "word thinking" is more complex and lacks the directness of "visual thinking", as for example when comparing the effectiveness of the word-sign "turn-right" with the symbol-sign of an arrow pointing right (Modley, 1976). The result seems to favour the symbol-sign over the word-sign.

In 1977, a thorough research in signs and signage systems used in Canada was conducted by the join effort of the Canada Safety Council and the Canadian Society of Safety Engineering. As a result of the study, a "Signs and Symbols for the Occupational Environment Standard" was developed recognizing that the standardization of signs is urgently needed (CSA, Can3-z321-1977).

In a recent study, Collins (1982) summarized the advantages and disadvantages in using symbols.

1. The language-free aspect of symbols is particularly useful in an ever-increasing language-mix public environment.

2. The visual simplicity, directness and clearness of the symbol may trigger direct and appropriate response, such as in the case of the sign with a bent-right arrow which signifies right-turn.

3. The "spatial compactness" of the symbol can represent a whole object by highlighting part of the intended object. For instance, a telephone hand set can identify the location of a public telephone. Consequently, less space is needed for the symbol on a sign or label.

However, there are limitations on the use of symbols. They are as follows:

1. A pictorial sign can be recognized only when the audience is familiar with or has previous experiences related to the object depicted, otherwise, learning is necessary for the public to understand unfamiliar and abstract symbols.

2. The relative effectiveness of the symbols may be

inhibited due to shortage of syntactical rules for structuring concepts in pictorial form. For example, the object represented in prohibitional signs is confusing because the "forbidden item is often overlooked or misunderstood" (Collins, 1982, p.13).

3. Symbols also have limits on "commenting upon or evaluating information" except for identification of objects, indication of facilities and presentation of instructions (Collins, 1982, p.13).

4. Most of the symbols cannot express the full meaning of the intended message without additional verbal description. Their comprehension is quite dependent on the cultural and technological context and their placement. For example, the "Stop" sign depicting the hand of a policeman closely resembles an insult gesture among the taxi drivers in Paris.

The proliferation of signs calls for standardization for safety and communicational reasons by concerned organizations and governmental agencies, and has led to a series of experiments. Research projects are conducted singly or jointly by professionals in the field of social sciences, humanities and engineering at national or international level. A literature review of the development of symbols will be discussed in the following sections.

# CHAPTER 2
# LITERATURE REVIEW

This section has three parts. The first part is a brief history of conventions related to symbol signs. The second part deals with studies on universal symbol language. The third part discusses laboratory and field research on symbols in five fields of application which are highway, automotive, public information, material labelling and safety.

## 2.1 History of Conventions on Road Signs

After World War II, interest was rekindled for the unification of coordinated sign systems in order to accommodate the growing traffic volume among cities and countries. The advancement of transportation technology and the pressure generated by the great amount of people travelling internationally can be accounted for as one of the reasons behind the earliest conventions on road signs held in this century.

One of the first traffic signs system was initiated by the Italian Touring Club in 1895 (Modley, 1976). In 1900, at a Congress of the International League of Touring Organizations in Paris, proposals were made regarding standardization of road signs. In 1909, four pictorial symbols related to danger conditions were adopted by nine European governments in a Convention with Respect to the International Circulation of Motor Vehicles in Europe. These symbols are "bump", "curve", "intersection" and "grade level railway crossing". This event is considered as the beginning of the official international standardization of highway signs (Eliot, 1960).

In 1927, due to a great concern for the safety of pedestrians and motorists, and for the prevention of chaos in highway caused by the persence of advertising signs, the Manual of Uniform Traffic Control Devices was published in the U.S.A. It outlined the official standards on road signs, and became adopted by most of the States (Walker, Nicolay and Stearns, 1965).

In 1928, a set of regulatory signs different from the one

adopted in the United States was proposed by the traffic committee of the League of Nations. By 1931, a conference in Paris adopted a Convention for the Unification of Road Signs and Signals. At that time, the number of road signs had increased from 6 to 26. Concurrently, shapes and colors of the signs were studied for standardization.

After World War II, in 1949, the Convention on Road Traffic and the Protocol on Road Signs and Signals was adopted by the United Nations at Geneva. The system was based on the European tradition which is heavily symbolic oriented (Zuniga, 1969). In addition to the 26 signs used in 1931, 24 signs were added.

In 1960, the Manual of Uniform Traffic Devices for Canada was published. In 1963, the United Nations Protocol was included in the Canada system with some modifications in regards to the bilingual English and French convention of the Canadian road signs.

Whereas the United Nations Protocol was used by the European countries and relies mainly on graphic symbols, the road sign system in the United States relies mainly on written word messages, as outlined in the 1927 manual. Not until a revised Protocol was adopted by the United Nations in 1968, did the United States system start to incorporate symbols into their system (Collins, 1982).

## 2.2 Studies on Universal Symbol Language

While most conventions were devoted to the problems of traffic signs, between 1920-1940's, Otto Neurath originated the use of simple pictographs to present information known as ISOTYPE (International System of Typographic Picture Education). He believed that statistical or factual information related to housing, economy and health can be presented by means of pictographs. The symbols he created stand for 850 common words. Nevertheless, Neurath realized that these symbols are just "word supplement" and could be used as "adjunct to any language of the world" (Bolian, 1975, p.20).

Between 1942 and 1949, Charles Bliss established a symbol system called Semantography. It is a simple system that consists of 100 basic pictorial symbols which can be combined in order to create a wide range of messages

according to its grammatical structure -- regarded by Bliss as simple logic and semantics (Dreyfus, 1972). To some extent, the symbols share the characteristics of the real objects. Bliss's intention for the system was to be free from translation and to be understood by all prople, however, he empahsized that the system is only "an auxiliary medium, to be used where the language barrier must be bridged" (Dreyfus, 1972, p.23).

In addition to the work by ISOTYPE and Semantography, investigations along the same line continued. In 1964, Margaret Mead called for an international graphic symbol -- Glyphs -- which should have no cultural bias (see page 1).

In the number 6 issue of Icographic (1973) another symbol system was reported. Yukio Ota proposed an experimental pictorial language -- LoCoS. The aim of the system is to achieve "mutual communication" (Ota, 1973). The LoCoS is based on the hieroglyphic nature of Japanese characters -- Kanji. The components or picture elements of LoCoS are made up of 18 simple geometric forms and words are constructed by various groupings of these elements. Ideally, it combines form, sound and meaning and can be understood when one sees it.

In the past, more than 300 studies have tried to establish a universal language, the most famous one is an artificial language -- Esperanto -- invented by L.L. Zamenhof in 1887 (Mitchell, 1983). Despite those linguistic attempts, the challenge of creating a universal symbol language is still faced by today's scientists and designers.

## 2.3 Research in Five Fields of Application

In this section, research findings will be discussed in groups according to their field of application such as highway, automotive/machinery controls, public information, materials and product labelling, and safety.

1. HIGHWAY SYMBOLS
   Numerous studies have concentrated on highway signage: their results demonstrate that symbol signs can be created which are superior to word signs.

   Early in 1934, Janda documented a pioneering research on

the effectiveness of various highway signs and concluded that symbols signs triggered faster reaction than word signs and "a large symbol on any shape sign is more effective than any combination of words and symbols. Words alone were considered least effective (Janda and Volk, 1934, p.442).

The accuracy of recognition is greater for symbols than for word signs. This is supported by a comparative study between American and international road signs (Walker, Nicolay and Stearns, 1965). Moreover, performance is relatively better for symbol signs than for verbal ones (King, 1971, 1975, Plummer et al., 1974, Dewar and Ells, 1974). Likewise, symbolic messages are recognized faster than word messages, even when visual degradation, interference or distraction is presented (King, 1975, Ells and Dewar, 1979).

Symbol signs also produce fewer errors than word signs when verbal interfernce is introduced during the tests (Hoffmann and MacDonald, 1980).

Furthermore, legibility for symbols is greater than for words (Dewar, Ells and Mundy, 1976).

Regarding visibility of highway symbols, Smith and Weir (1978) found that directional symbol signs under poor visibility performed better than word signs. In a lane control experiment, Forbes et al. determined that a red "X" is effective for communicating no access for vehicles and is flexible for installation too (Forbes, Gervis and Allen, 1963).

With relation to interpretability of road signs, Brainard et al. commented that stereotypes enhance recognition (Brainard, Campbell and Elkin, 1961). In total, these findings positively show that symbols have various advantages over words.

## 2. SYMBOLS FOR AUTOMOTIVE/MACHINERY CONTROLS

The American National Standard, "Symbols for Operator Controls on Agricultural Tractor and Agricultural Machinery" states that standardization of symbols is crucial because "agricultural tractors and machinery are often operated by people who are of a different nationality and use a different language than is

prevalent for the supplier or manufacturer of the particular machinery" (ANS. B114.2, 1979).

In 1970, Easterby outlined the principles for machine symbol design and these were later revised and adopted in the ISO guideline (see ISO TR 7239 for details).

Cahill's data reveal that pictorial machine symbols such as "Fuel" or "Hand brake" are better identified than those depicting instructions for action such as "Engage" or "Hours running" (Cahill, 1975). Also, past experience with symbols shown in an appropriate context enhances subjects' performance.

Examining the specific design features of the symbols, Cahill comments that "symbols do differ among themselves in their ease of interpretability" (Cahill, 1976, p.647). He suggests that learning is essential, especially when dealing with abstract symbols such as "Radiation".

Concerning the orientation of the symbols, Green and Davis (1976) found that rotated pictographic symbols for automobile controls may hamper drivers reaction time in comparison to the upright positioned symbols.

Analyzing the data pertaining to automobils symbols, Heard (1974) recommends that for standardization purpose, symbols should be correctly recognized by at least 75 percent of the subjects or better, with no more than 5 percent of confusion with other symbols within a set. Heard also suggests the need for an educational program in order to improve the recognition of symbols.

## 3. PUBLIC INFORMATION SYMBOLS

Due to the communicative features of symbols, their application has been extended from exterior usage such as highways, to interior usage, such as the built environment.

In 1966, the first interorganizational committee was formed under the initiation of ICOGRADA (International Council of Graphic Design Associations). Its aim was to try to "co-ordinate the contagious inventions of signs and to persuade the initiators that research and tests were essential" (Herdeg, 1981, p.20).

In 1973, the ISO carried the task of the development of international signs and symbols, one of the results was the first international standard on public information symbols: ISO 7001 (Simlinger, 1980).

Sponsored by the ISO, Easterby and Zwaga (1975) started to develop research methods to investigate comprehensibility of public symbols. The main research aimed at measuring the relative performance of symbols within their own set. Two methods used in this pilot investigation -- ranking and recognition tests -- were applied in another extensive study with seven countries involved (Easterby and Graydon, 1981). With slight revision, these testing procedures were later adopted by ISO TC 145 SC1.

Under the supervision of the Department of Transportation of the United States, research programs were conducted in 1974 (DOT OS 40192, 1974, Collins, 1982). In contrast to Easterby's methodology, methods such as multiple choice, matching test and field testing were used. Subsequently, with the assistance of the AIGA (American Institute of Graphic Arts) a system of symbols related to passenger/pedestrian was prepared.

Another method which has been used by Dewar and Ells (1977) is the semantic differential technique. This measures "the degree of psychological meaning of an object or concept" (Dewar and Ells, 1977, p.183). However, this method does not reveal whether subjects understand the exact meaning of the symbols or not (Collins, 1982).

Using comprehension and preference tests to examine the design features of the symbols, Mackett-Stout and Dewar (1981) found that pictorial symbols are more understandable than abstract equivalents.

The above mentioned methods in evaluating symbols do have merits of their own, and their results should be value for cross reference.

## 4. SYMBOLS FOR MATERIALS AND PRODUCT LABELLING

Few studies have been conducted in labelling concerning safety. Easterby and Hakiel (1977a) tested three symbols: 'poison', 'fire' and 'caustic' for labelling. In

comparison, descriptive symbols for labelling are preferred over prescriptive and proscriptive symbols.

Subjects also prefer symbols loaded with details over simplified versions. Easterby et. al., concluded that symbol image is the key factor contributing to comprehension, since it is independent from the stereotyping of color used, although certain color stereotypes are hazard dependent (Easterby and Hakiel, 1977b).

With regard to the identification of hazardous materials, Lewis (1975) expressed that improper storage or use of hazardous materials may result in serious human and property loss. Thus, a universal system for labelling hazardous materials is needed. Likewise, in a 1984 OSHA Draft: "Accident preventin tags", the issue of whether or not to apply pictographs on tags was discussed (OSHA, 10-2 Draft, 1984).

Although studies on materials and product labelling are few, it is an area of importance that deserves more research in respect to public health and safety.

## 5. SAFETY SYMBOLS

Most of the tests in this area are done in the United States by Collins and her colleagues. Collins and Pierman (1979), and Lerner and Collins (1980) conducted tests on 22 fire safety symbols. They found that symbols should be validated before implementation because symbols currently in use such as "Blind Alley" and "No Exit" elicited opposite interpretation. If symbols are used without prior testing, unnecessary accidents may occur (Collins, 1983). Due to the above findings, an indepth research related to symbol for "Exit" was conducted (Collins and Lerner, 1983a).

Collins, Lerner and Pierman (1982) conducted another test on 33 industrial safety symbols and results indicated that the percentage of comprehensibility varied greatly. Symbols for radiation, laser, general warning and biohazard are least recognizable. In contrast, symbols for protective gear, first aid, prohibition and fire emergency were well understood.

A similar study was carried by Collins (1983) related to

the mining industry. Once again, abstract symbols such as radiation and biohazard were least well identified.

As indicated by Collins (983) only five studies have examined some safety signs, and an indepth study is desirable. The research presented in the next section was conducted by the author and is an attempt to apply an experimental methodology for studying safety symbols at an international level.

# CHAPTER 3
# SAFETY SYMBOLS RESEARCH PROGRAM SEQUENCE

## 3.1 Compilation of Existing Material

Various government agencies, organizations, sign manufacturers and researchers involved directly or indirectly in the health and safety of the work environment were consulted through personal contact or correspondence. One hundred and forty eight (148) enquiry letters were sent to 47 countries around the world. Sixty two (62) responses were received. Some responses expressed need for the development of new symbols while some were concerned about the appropriateness of the existing ones. It became apparent during this survey that safety symbols which have not been tested are currently being used in some countries.

Compilation of safety symbols giving information for use in the prevention of accidents, for warning of health hazards and for meeting certain emergencies was made through library research, correspondence and personal contact. A 60 safety referents resource book (including over 1400 variants) was then produced.

## 3.2 Selection

A preliminary phase of screening was developed. The function of this phase was to eliminate the redundance of variants which have exactly the same image content. After this screening, materials were prepared for the Appropriateness Ranking Test.

## 3.3 Appropriateness Ranking Test

1. INTRODUCTION

After the previous process of screening, the Appropriateness Ranking Test was used as the first part of two tests.

The aim of this test is to reduce the number of symbol variants to a manageable number for further testing and to measure the relative performance of the symbols

against one another.

## 2. METHOD

### Subjects

The intended number of Subjects (Ss) for the test was 80; 40 in Chile and 40 in Canada. Given problems relating to the Chilean test station where uncertainties developed concerning the number of subjects, the Canadian sample was extended to 50 (25 people under the age of 30 and 25 over 50). In Chile, only nine people under the age of 30 and nine over 50 finished the test. (Data on the in-between ages 30-50 is unnecessary. Major differences in the comprehension of symbols were found in the past mainly between the oldest and the youngest subjects. Therefore, it became apparent that using only groups in the extremes of the adult age range was more efficient, since arrival at good level of recognition for one variant by both these groups would guarantee recognition by middle age subjects. See AP Report 60, Evaluation of Public Information Symbols: ISO Tests: 1975 series).

Composition of the Ss sample represented all walks of life. Only the condition that no Subject could be a student or professional involved in the field of art and design (i.e. artist, designer) was applied.

Ss were allowed to complete the test at their own pace. However, it was found that a small number of Ss over 50 years of age had some problems in retaining concentration after doing half of the test. Normally the test required about one and half hours to finish.

### Apparatus

Among the 60 safety related referents collected through personal contact and correspondence with various governmental departments, organizations and sign manufacturers, 16 referents were chosen according to their relationship to hazards existing in places and with equipment accessible to the public.

Variants of the 16 referents were screened in a preliminary phase to eliminate redundance in image content (AP Report 99, p.4).

After the preliminary screening, a set of test cards (size A7 - 70 mm x 107 mm) was made for each referent, each card carrying one of the symbol variants to be tested. Each symbol was reproduced to a standard size of 25 mm x 25 mm and was then positioned in the centre of the card. On the right top corner of the card a three letter code for identification of the variant was inscribed. The first letter indicated the referent and the other two letters were randomly assigned to specify the variant (see Appendix 1 and the Industrial Safety Symbol Source Book). Letters were used instead of numbers in order to avoid suggestion of sequential order.

When presenting the material to the Ss, all cards for a given referent were made up into a pack. The variants were randomly arranged for each trial. Ss were asked to rank 16 sets of variants. The researcher recorded the results in scoring sheets provided (materials were prepared in Spanish for the Chile test station, see Appendix 2, 3).

## Procedure

The Appropriateness Ranking Test was conducted in Canada and Chile during the summer of 1985. Before the test, the researcher explained the procedure of the test to each Subject. They were also informed of the name, function and field of application of each referent.

Ss ranked the variants of one given referent at a time. To do this, they were asked to spread all the cards for one referent on a table and rank the cards. Once this was done, a second pack was given while the researcher started recording the already completed ranking sequence on the score sheet. The process continued until the Subject finished all of the 16 packs.

## 3. RESULTS

Sixty eight (68) raw score sheets were obtained from two participating countries -- Canada and Chile. Twenty five (25) responses from Subjects under the age of 30, and 25 responses from Subjects over 50 years of age were collected in Canada. Nine (9) responses from Subjects under the age of 30, and nine (9) responses from Subjects over the age of 50 were received from Chile. Except for one case (Sharp Edge, Appendix 21), the two countries coincided in the ranking of referents.

Preference for each variant was obtained by adding the ranking position of the variant chosen by the 68 Ss in both countries (the lower result figures indicated the higher preferences).

A sample of computed output indicating the total scores of the variants of a given referent is shown in appendix 4.

In appendices 5 to 22 variants are presented in order with codes below them, organized as follows: the first row of letters identifies the referent and the variant; the second row stands for the source(s) of origin; the third row indicates order in the Appropriateness Ranking Test, and the last row is the raw score of the variant (the product of the addition of the position in the rank given by all the Ss). The 15 best performing variants of each referent are shown in ranked order for 14 referents in order to offer enough alternatives so as to select variants having significant difference in image content. Exceptions are the referents "Eye Protection Required" and "No Open Flame", where 35 and 22 ranked variants are shown respectively.

Using the guidelines approved by the ISO TC 145 SC1, the selection procedure was conducted as follows:

The three variants with the best score in each referent were chosen for the Comprehension/Recognition Test as long as enough difference of image content warranted comparison of performance. Where two of the selected variants for a referent were too silmilar in terms of the image content, the next best performing variant with a more different image content was selected for the Comprehension Test. The enclosure of the selected symbols was modified in order to present a unifying border (see

Appendix 23 to 26).

## 4. CONCLUSION

The Appropriateness Ranking Test provided a useful technique for reducing the number of variants to manageable proportions for further testing. The ranking test method proved reliable in that the results were consistent within groups of respondents and also between groups of respondents. The limitation of the ranking test is that it does not guarantee that the most reliably comprehended symbols are ranked as most appropriate: the test is simply a practical expendient to reduce the number of variants for more complex testing techniques. This limitation of the Appropriateness Ranking Test must always be kept in mind when reviewing the outcome of the present research (AP Report 99, p.1).

## 5. FURTHER DEVELOPMENT

Based on the procedure guidelines stated in ISO TC 145 SC1, a Comprehension/Recognition Test was developed in order to arrive at a reliable image content for the 16 referents under study. Three variants from each of the 16 safety referents were selected in the previous test and booklets were prepared and sent to seven countries for the Comprehension/Recognition Test.

## 3.4 Comprehension/Recognition Test

## 1. INTRODUCTION

Further to the selection of three variants for the visualization of each one of 16 safety related symbols, a comprehension test was conducted.

While the Appropriateness Ranking Test measures the relative performance of variants of a symbol against one

another, the Comprehension/Recognition Test measures in absolute terms the clarity of the meaning of a graphic symbol.

With a restricted number of versions available for each referent (three versions for each of the 16 referents in the present study), a further method of evaluation involves the respondents examining the individual symbols and attempting to identify a function which they think relates to the symbol. This stage of the procedure is called a comprehension test since it is related to many similar tasks categorized as comprehension/recognition tasks in the psychological literature (see for example Osgood 1964).

## 2. METHOD

### Subjects

Previous studies of this type have revealed that there are significant differences with age that occur between the older age group (aged 50 or over) and the younger age group (under 30). To improve the efficiency of the testing, it was decided to only test an older age group and a younger age group and to leave out the middle age group. The matching study of Zwaga and Boesama indicate that stereotype responses for the middle age group can be reliably predicted from the responses obtained from young and old subjects' responses. Again based on the experience of these previous tests, a sample of 20 in each age group from each testing country was considered adequate to achieve the desired reliability.

Thus each country's test program yielded 20 responses in each age group for each of the three versions of the 16 test referents.

### Apparatus

#### a) Selection of variants

For each of the 16 referents, three variants were

selected for study, based on the Appropriateness Ranking Test data. For convenience, each of the three variants for each of the 16 referents was coded as either pink, blue or yellow, thus simplifying the handling of the experimental material and also allowing color coding of the referents in the stimulus material.

As with the preceding ranking tests, the 16 referents selected for testing in this series were:

beware of steps
corrosive
slippery floor
hard hat required
high voltage
no open flame
explosive
foot protection required
flammable
no trespassing
eye protection required
overhead hazard
poison
radiation
sharp edge
trip hazard

The particular symbols used for the referents were derived from the previously conducted ranking tests and the actual symbols used for the present study are shown in the appendix 23 to 26 of this report. The identification code below each symbol identifies the organization or authority which is currently using this symbol for the particular referent, or the source from which the symbol was derived.

### b) Preparation of material

For each variant, a black printed copy was prepared on a A7 size sheet, with the symbol occupying an area of around 25 mm by 25 mm.

A given set of referents -- pink set, blue set or yellow set -- was then randomized and bound in order to make a small booklet to be used by the respondent. Thus each booklet had arranged, in

random order, a variant for each of the referents under test i.e. 16 symbols to which they had to attribute the meaning, no two of which referred to the same referent (intended meaning).

A preliminary symbol was included at the beginning to illustrate the procedure. For the 16 test referents, three alternative versions for each referent were tested and there were thus three different series of test booklets.

Series A: coded pink
Series B: coded blue
Series C: coded yellow

## Liaison with test countries

Responses to these sets of symbol variants were requested from seven different countries:

- Canada
- Chile
- Hong Kong
- Hungary
- Japan
- The Netherlands
- Turkey

Comprehensive instructions on the procedures to be used in collecting and summarizing the data were circulated to liaison contacts in each of the seven countries (see Appendix 27 to 30).

## Procedure

Complete sets of test booklets (40 pink, 40 blue and 40 yellow series) and necessary instruction were dispatched to each of the seven collaborating test stations for

conducting the tests (see Appendix 27 to 30). The material was dispatched in November 1985 with a request for it to be returned by February 1986.

Data from only four countries (Canada, Hong Kong, Hungary and Japan) became available for final interpretation here, since some stations were unable to complete the tests on time.

## Data Analysis

Responses for all variants were separately recorded onto a summary sheet by liaison persons in the various countries (see Appendix 31 to 34 for samples). Then, responses in all the summary sheets were transferred onto a master sheet which includes all the responses from all countries of the two age groups (see Appendix 35 to 37).

Each response for a given variant was then assigned to one of seven standard categories by each of 3 judges in order to reduce data for subsequent evaluation. This categorization by the 3 judges, was carried out working independently, each judge considering the function and field of application of the corresponding referent. The following standard categories were used:

| | Category |
|---|---|
| Certain | 1 |
| Likely certain | 2 |
| Marginally likely | 3 |
| Opposite meaning | 4 |
| Wrong | 5 |
| Don't know | 6 |
| Missing | 7 |

## Tabulation

The responses categorized by the 3 independent judges were thereafter compiled and summarized into a final stage by means of a scoring system.

From appendix 38 to 53, each of the 16 referents is shown

in an individual tabulation. This shows the overall average percentage response, rounded to the nearest integer value (over all countries and both age groups), in each of the reduced coding categories for each of the three variants (AP Report 100).

Examining the summaries from all four countries for 16 referents, only seven variants show a percentage of correct responses accumulated from categories 1 and 2 that surpasses 70%. These are as follows:

Variant Blue of Beware of Steps
Variant Pink of Slippery Floor
Variant Blue of No Trespassing
Variant Yellow of Hard hat Required
Variant Pink of High Voltage
Variant Blue of No Open Flame
Variant Blue of Overhead Hazard
(see Appendix 38 to 44)

For the development of guideline examples, due to time constraint and in order to investigate different problems of visualization, it was decided not to develop the "No Trespassing" symbol, whose image content included basically a human figure, and "Overhead Hazard" and to develop "Corrosive", that posed a different visualization problem, although the performance of the latter in the Comprehension/Recogniton Test fell below the required level.

## 3.5 Improvement to the Visual Presentation of the Image Content

In addition to the adoption of the image content of the best performing variant of the symbols tested, changes in their visual design were developed on two bases: 1) the recommendations outlined in ISO TR 7239 (see Attachment #1), and 2) the visual style of guideline examples already published in ISO 7001 (see Attachment #2) and the need to maintain visual consistency with them. In addition, the author exercised judgement for a number of small visual decisions with a view to improving the legibility of the symbols.

The geometrization of the figure follows ISO 7001 and ISO TR 7239. It is worth mentioning that this geometrization

intends to direct the attention of the viewer to the action developed, by avoiding irrelevant details such as clothing.

1. BEWARE OF STEPS

This was based on Variant Blue (see page 25 and Appendices 5, 38, 54 and 55). The side view of the figure was represented more erected so that it would look as walking more decidedly and not as cautiously as the original variant blue shows. The leg stepping into the void is represented more separated from the first step of the stairs so as to avoid the merging of the two elements.

2. CORROSIVE

This was based on Variant Yellow (see page 25 and Appendices 6, 39, 56 and 57). Although the best performing variant under testing conditions was variant pink, the yellow one was chosen for legibility reasons. Under real implementation conditions the symbol will have to be understood either from a distance in vehicles or in large containers, or in small size when applied to hand-held containers. With this in mind, it was considered appropriate to reduce the number of elements included in the symbol so that, despite small reproduction sizes or great viewing distance, legibility could be improved by maintaining the largest possible size of the significant elements.

The liquid in the tube and the droplets are rendered in outline form to suggest transparent or translucent substances. In the version for small scale reproduction of this symbol, only the top line indicating the level of the liquid in the lab tube is shown.

The corroded part of the hand was increased in size and the wiggly lines representing burning were developed more separated from one another and from the droplets so as to avoid the merging of all these elements.

The portion of the sleeve shown in the original design was eliminated following the same criteria applied for

the elimination of the other elements appearing in variant pink (reduction of number of elements so as to afford the largest possible size for every significant detail).

## 3. SLIPPERY FLOOR

This was based on Variant Pink (see page 25 and Appendices 7, 40, 58 and 59). Curved lines indicating movement of both arms are added. The left arm is slightly bent backwards to enhance the dynamism of the fall. The leg contacting the floor is slightly bent in order to create a more realistic look. The outline representation is changed for solid figure according to legibility criteria and consistency with ISO 7001.

## 4. HARD HAT REQUIRED

This was based on Variant Yellow (see page 25 and Appendices 8, 41, 60 and 61). Tonal reversal was applied in order to maintain consistency with the rest of the set. The overall shape and the reinforcing ribs remain the same with slight simplification of the strap slots.

## 5. HIGH VOLTAGE

This was based on Variant Pink (see page 25 and Appendices 9, 42, 62 and 63). The electric cord is longer and more wiggling than the one in the selected variant. The wires in its end are longer and more separated from one another. This was done in order to avoid confusion with snake head shape.

The left leg of the falling human figure is bent in order to create a more realistic look. This look is also enhanced by the overall slant of the figure. The proportions of the zig-zag line inside the figure were changed so as to improve its legibility.

### 6. NO OPEN FLAME

This was based on Variant Blue (see page 25 and Appendices 10, 43, 64 and 65). Shapes, sizes and motions of the flame are modified in order to render a more flickering flame. These modifications attempt to avoid confusion with the shape of a shrub. The flame and the prohibition slash are separated by a white gap in order to achieve a better differentiation between the two elements.

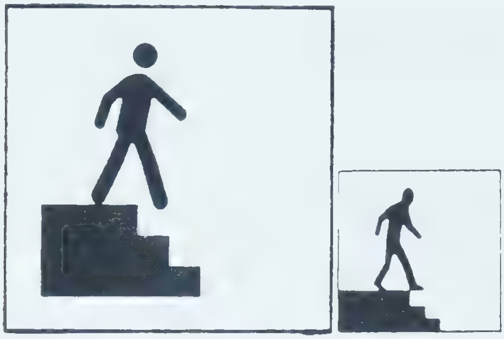
The resulting data indicate that the level of comprehension of the safety symbols Eye Protection Required, Explosive, Foot Protection Required, Flammable, Poison, Radiation, Sharp Edge and Trip Hazard, fell below the threshold for general acceptance defined by ISO. (This requires that public information symbols attain a 66% recognition).

Symbols such as Explosive (62.9%), Flammable (42.7%), Poison (58.3%) and Radiation (43.7%) have been used for many years, however, their performance is very poor, particularly in relation to the hazards they represent.

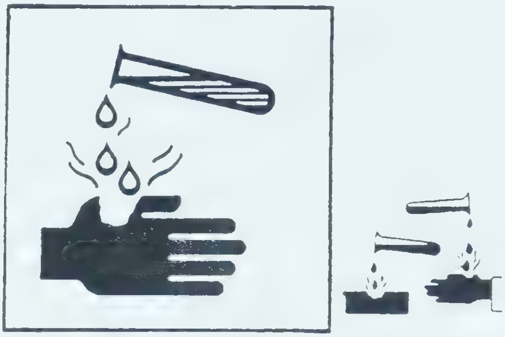
# CHAPTER 4

## SIX EXAMPLES OF THE PROPOSED SAFTY SYMBOLS

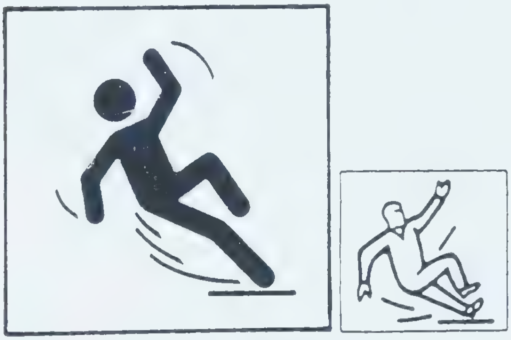
Six examples of the proposed safety symbols designed by the author on the bases explained above, alongside the graphic symbols used for the test.



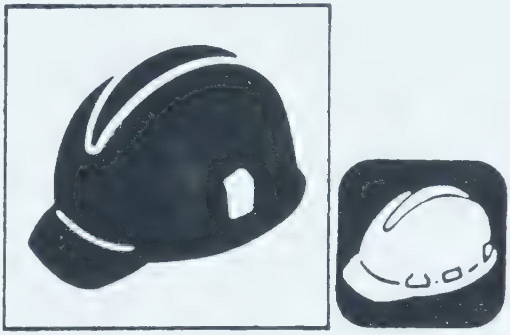
Beware of Steps
(Appendices 5, 38, 54 and 55)



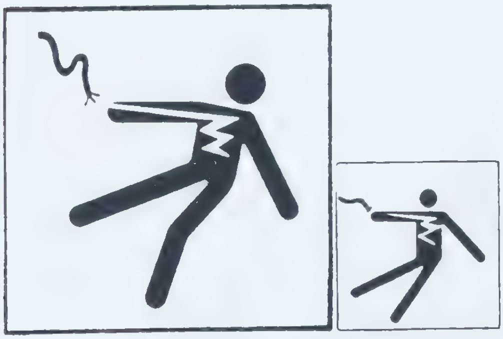
Corrosive
(Appendices 6, 39, 56 and 57)



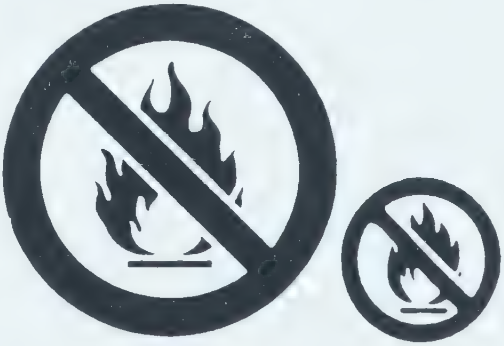
Slippery floor
(Appendices 7, 40, 58 and 59)



Hard Hat Required
(Appendices 8, 41, 60 and 61)



High Voltage
(Appendices 9, 42, 62 and 63)



No Open Flame
(Appendices 10, 43, 64 and 65)

# CHAPTER 5
# CONCLUSION

The Appropriateness Ranking Test and the Comprehension/Recognition Test in this research project on the design of safety symbols, provide data supporting the adoption of seven variants. In addition, the responses generated by this study provide valuable information that could be used for further analysis relating to design criteria for hazard related symbols. Due to the overall low comprehension rate of the safety symbols which are currently used in some countries, extensive safety related educational and research programs are needed.

By following the operational research method I was able a) to determine, out of the 1400 variants collected, which were the six that performed at the ISO expected level, and b) on the basis of additional information relating to the visual presentation of graphic symbols, I was able to develop six designs that, presummably, would improve the performance of those related variants when implemented in the appropriate settings.

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**8** Appropriateness Ranking Test Results: Hard Hat Required

**9** Appropriateness Ranking Test Results: High Voltage

**10-11** Appropriateness Ranking Test Results: No Open Flame

**12** Appropriateness Ranking Test Results: Foot Protection Required

**13** Appropriateness Ranking Test Results: Flammable

**14** Appropriateness Ranking Test Results: No Trespassing

**15-16** Appropriateness Ranking Test Results: Eye Protection Required

**17** Appropriateness Ranking Test Results: Explosive

**18** Appropriateness Ranking Test Results: Overhead Hazard

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**43** Comprehension Recognition Test Results: No Open Flame

**44** Comprehension Recognition Test Results: Foot Protection Required

**45** Comprehension Recognition Test Results: Flammable

**46** Comprehension Recognition Test Results: No Trespassing

**47** Comprehension Recognition Test Results: Eye Protection Required

**48** Comprehension Recognition Test Results: Explosive

**49** Comprehension Recognition Test Result: Overhead Hazard

**50** Comprehension Recognition Test Results: Poison

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**58** Draft Standard: Slippery Floors

**59** Draft Standard: Large-scale example of Slippery Floors

**60** Draft Standard: Hard Hat Required

**61** Draft Standard: Large-scale example of Hard Hat Required

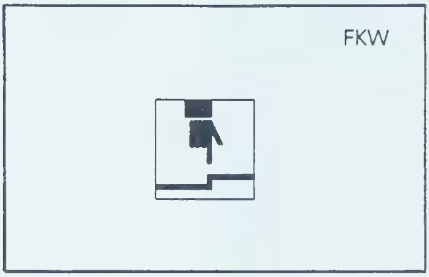
**62** Draft Standard: High Voltage

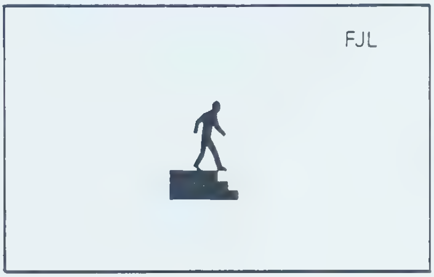
**63** Draft Stnadard: Large-scale example of High Voltage

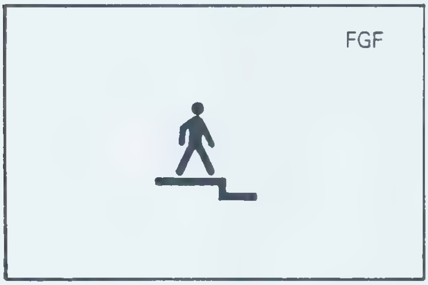
**64** Draft Standard: No Open Flame

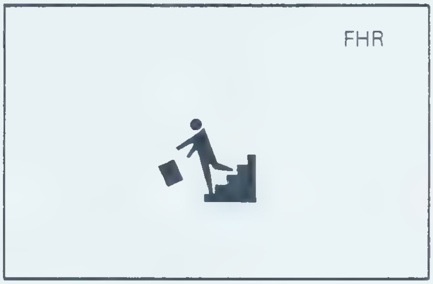
**65** Draft Standard: Large-scale example of No Open Flame

## Appendix 1
## A sample set of test cards for the referent Beware of Steps



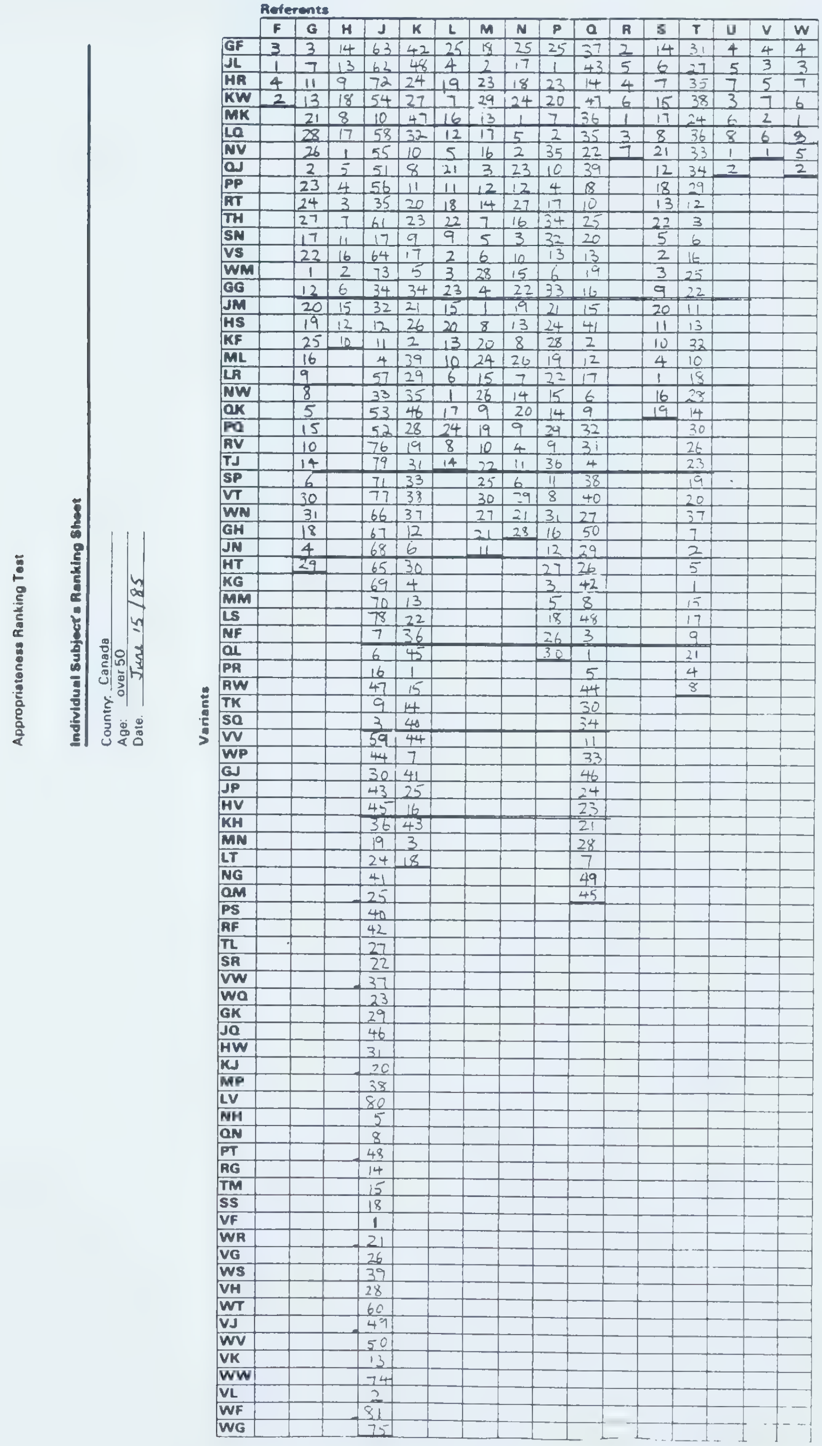






(The example has been reduced for this thesis.)

## Appendix 2
## Individual subject's ranking sheet: Canada



Appropriateness Ranking Test

**Individual Subject's Ranking Sheet**

Country: Canada
Age: over 50
Date: June 15/85

**Referents**

**Variants**

|  | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GF** | 3 | 3 | 14 | 63 | 42 | 25 | 18 | 25 | 25 | 37 | 2 | 14 | 31 | 4 | 4 | 4 |
| **JL** | 1 | 7 | 13 | 62 | 48 | 4 | 2 | 17 | 1 | 43 | 5 | 6 | 27 | 5 | 3 | 3 |
| **HR** | 4 | 11 | 9 | 72 | 24 | 19 | 23 | 18 | 23 | 14 | 4 | 7 | 35 | 7 | 5 | 7 |
| **KW** | 2 | 13 | 18 | 54 | 27 | 7 | 29 | 24 | 20 | 47 | 6 | 15 | 38 | 3 | 7 | 6 |
| **MK** |  | 21 | 8 | 10 | 47 | 16 | 13 | 1 | 7 | 36 | 1 | 17 | 24 | 6 | 2 | 1 |
| **LQ** |  | 28 | 17 | 58 | 32 | 12 | 17 | 5 | 2 | 35 | 3 | 8 | 36 | 8 | 6 | 8 |
| **NV** |  | 26 | 1 | 55 | 10 | 5 | 16 | 2 | 35 | 22 | 7 | 21 | 33 | 1 | 1 | 5 |
| **QJ** |  | 2 | 5 | 51 | 8 | 21 | 3 | 23 | 10 | 39 |  | 12 | 34 | 2 |  | 2 |
| **PP** |  | 23 | 4 | 56 | 11 | 11 | 12 | 12 | 4 | 18 |  | 18 | 29 |  |  |  |
| **RT** |  | 24 | 3 | 35 | 20 | 18 | 14 | 27 | 17 | 10 |  | 13 | 12 |  |  |  |
| **TH** |  | 27 | 7 | 61 | 23 | 22 | 7 | 16 | 34 | 25 |  | 22 | 3 |  |  |  |
| **SN** |  | 17 | 11 | 17 | 9 | 9 | 5 | 3 | 32 | 20 |  | 5 | 6 |  |  |  |
| **VS** |  | 22 | 16 | 64 | 17 | 2 | 6 | 10 | 13 | 13 |  | 2 | 16 |  |  |  |
| **WM** |  | 1 | 2 | 73 | 5 | 3 | 28 | 15 | 6 | 19 |  | 3 | 25 |  |  |  |
| **GG** |  | 12 | 6 | 34 | 34 | 23 | 4 | 22 | 33 | 16 |  | 9 | 22 |  |  |  |
| **JM** |  | 20 | 15 | 32 | 21 | 15 | 1 | 19 | 21 | 15 |  | 20 | 11 |  |  |  |
| **HS** |  | 19 | 12 | 12 | 26 | 20 | 8 | 13 | 24 | 41 |  | 11 | 13 |  |  |  |
| **KF** |  | 25 | 10 | 11 | 2 | 13 | 20 | 8 | 28 | 2 |  | 10 | 32 |  |  |  |
| **ML** |  | 16 |  | 4 | 39 | 10 | 24 | 26 | 19 | 12 |  | 4 | 10 |  |  |  |
| **LR** |  | 9 |  | 57 | 29 | 6 | 15 | 7 | 22 | 17 |  | 1 | 18 |  |  |  |
| **NW** |  | 8 |  | 33 | 35 | 1 | 26 | 14 | 15 | 6 |  | 16 | 28 |  |  |  |
| **QK** |  | 5 |  | 53 | 46 | 17 | 9 | 20 | 14 | 9 |  | 19 | 14 |  |  |  |
| **PQ** |  | 15 |  | 52 | 28 | 24 | 19 | 9 | 29 | 32 |  |  | 30 |  |  |  |
| **RV** |  | 10 |  | 76 | 19 | 8 | 10 | 4 | 9 | 31 |  |  | 26 |  |  |  |
| **TJ** |  | 14 |  | 79 | 31 | 14 | 22 | 11 | 36 | 4 |  |  | 23 |  |  |  |
| **SP** |  | 6 |  | 71 | 33 |  | 25 | 6 | 11 | 38 |  |  | 19 |  |  |  |
| **VT** |  | 30 |  | 77 | 38 |  | 30 | 29 | 8 | 40 |  |  | 20 |  |  |  |
| **WN** |  | 31 |  | 66 | 37 |  | 27 | 21 | 31 | 27 |  |  | 37 |  |  |  |
| **GH** |  | 18 |  | 67 | 12 |  | 21 | 28 | 16 | 50 |  |  | 7 |  |  |  |
| **JN** |  | 4 |  | 68 | 6 |  | 11 |  | 12 | 29 |  |  | 2 |  |  |  |
| **HT** |  | 29 |  | 65 | 30 |  |  |  | 27 | 26 |  |  | 5 |  |  |  |
| **KG** |  |  |  | 69 | 4 |  |  |  | 3 | 42 |  |  | 1 |  |  |  |
| **MM** |  |  |  | 70 | 13 |  |  |  | 5 | 8 |  |  | 15 |  |  |  |
| **LS** |  |  |  | 78 | 22 |  |  |  | 18 | 48 |  |  | 17 |  |  |  |
| **NF** |  |  |  | 7 | 36 |  |  |  | 26 | 3 |  |  | 9 |  |  |  |
| **QL** |  |  |  | 6 | 45 |  |  |  | 30 | 1 |  |  | 21 |  |  |  |
| **PR** |  |  |  | 16 | 1 |  |  |  |  | 5 |  |  | 4 |  |  |  |
| **RW** |  |  |  | 47 | 15 |  |  |  |  | 44 |  |  | 8 |  |  |  |
| **TK** |  |  |  | 9 | 14 |  |  |  |  | 30 |  |  |  |  |  |  |
| **SQ** |  |  |  | 3 | 40 |  |  |  |  | 34 |  |  |  |  |  |  |
| **VV** |  |  |  | 59 | 44 |  |  |  |  | 11 |  |  |  |  |  |  |
| **WP** |  |  |  | 44 | 7 |  |  |  |  | 33 |  |  |  |  |  |  |
| **GJ** |  |  |  | 30 | 41 |  |  |  |  | 46 |  |  |  |  |  |  |
| **JP** |  |  |  | 43 | 25 |  |  |  |  | 24 |  |  |  |  |  |  |
| **HV** |  |  |  | 45 | 16 |  |  |  |  | 23 |  |  |  |  |  |  |
| **KH** |  |  |  | 36 | 43 |  |  |  |  | 21 |  |  |  |  |  |  |
| **MN** |  |  |  | 19 | 3 |  |  |  |  | 28 |  |  |  |  |  |  |
| **LT** |  |  |  | 24 | 18 |  |  |  |  | 7 |  |  |  |  |  |  |
| **NG** |  |  |  | 41 |  |  |  |  |  | 49 |  |  |  |  |  |  |
| **QM** |  |  |  | 25 |  |  |  |  |  | 45 |  |  |  |  |  |  |
| **PS** |  |  |  | 40 |  |  |  |  |  |  |  |  |  |  |  |  |
| **RF** |  |  |  | 42 |  |  |  |  |  |  |  |  |  |  |  |  |
| **TL** |  |  |  | 27 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SR** |  |  |  | 22 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VW** |  |  |  | 37 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WQ** |  |  |  | 23 |  |  |  |  |  |  |  |  |  |  |  |  |
| **GK** |  |  |  | 29 |  |  |  |  |  |  |  |  |  |  |  |  |
| **JQ** |  |  |  | 46 |  |  |  |  |  |  |  |  |  |  |  |  |
| **HW** |  |  |  | 31 |  |  |  |  |  |  |  |  |  |  |  |  |
| **KJ** |  |  |  | 20 |  |  |  |  |  |  |  |  |  |  |  |  |
| **MP** |  |  |  | 38 |  |  |  |  |  |  |  |  |  |  |  |  |
| **LV** |  |  |  | 80 |  |  |  |  |  |  |  |  |  |  |  |  |
| **NH** |  |  |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **QN** |  |  |  | 8 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PT** |  |  |  | 48 |  |  |  |  |  |  |  |  |  |  |  |  |
| **RG** |  |  |  | 14 |  |  |  |  |  |  |  |  |  |  |  |  |
| **TM** |  |  |  | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SS** |  |  |  | 18 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VF** |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WR** |  |  |  | 21 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VG** |  |  |  | 26 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WS** |  |  |  | 39 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VH** |  |  |  | 28 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WT** |  |  |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VJ** |  |  |  | 49 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WV** |  |  |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VK** |  |  |  | 13 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WW** |  |  |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |
| **VL** |  |  |  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WF** |  |  |  | 81 |  |  |  |  |  |  |  |  |  |  |  |  |
| **WG** |  |  |  | 75 |  |  |  |  |  |  |  |  |  |  |  |  |

(The example has been reduced for this thesis.)

## Appendix 3
## Individual subject's ranking sheet: Chile

Encuesta Para Escala de Adecuacion

**Resultados de un individuo**

Pais: Chile
Edad: mayor de 50
Fecha: 20-IX-85

**Referentes**

**Variantes**

| | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GF | 3 | 16 | 9 | 69 | 21 | 4 | 6 | 12 | 34 | 15 | 1 | 7 | 34 | 5 | 7 | 5 |
| JL | 2 | 13 | 12 | 70 | 40 | 22 | 1 | 23 | 2 | 5 | 3 | 15 | 13 | 2 | 5 | 6 |
| HR | 1 | 1 | 7 | 60 | 16 | 12 | 8 | 19 | 36 | 18 | 5 | 12 | 33 | 6 | 1 | 1 |
| KW | 4 | 2 | 17 | 49 | 46 | 21 | 21 | 28 | 27 | 42 | 7 | 21 | 31 | 7 | 6 | 3 |
| MK | | 19 | 6 | 47 | 30 | 7 | 4 | 29 | 32 | 3 | 2 | 6 | 32 | 3 | 3 | 2 |
| LQ | | 22 | 16 | 65 | 26 | 6 | 17 | 18 | 3 | 4 | 4 | 16 | 5 | 4 | 4 | 8 |
| NV | | 6 | 14 | 63 | 20 | 8 | 23 | 27 | 28 | 31 | 6 | 10 | 30 | 1 | 2 | 7 |
| QJ | | 14 | 4 | 52 | 24 | 25 | 24 | 7 | 11 | 41 | | 11 | 14 | 8 | | 4 |
| PP | | 21 | 3 | 59 | 45 | 14 | 13 | 17 | 15 | 26 | | 19 | 28 | | | |
| RT | | 23 | 5 | 61 | 28 | 13 | 2 | 24 | 16 | 27 | | 14 | 15 | | | |
| TH | | 26 | 13 | 1 | 12 | 11 | 7 | 8 | 26 | 34 | | 22 | 23 | | | |
| SN | | 10 | 18 | 2 | 13 | 24 | 27 | 1 | 6 | 16 | | 17 | 10 | | | |
| VS | | 24 | 15 | 53 | 43 | 18 | 25 | 25 | 22 | 24 | | 13 | 23 | | | |
| WM | | 18 | 2 | 67 | 48 | 1 | 19 | 11 | 8 | 30 | | 20 | 19 | | | |
| GG | | 3 | 10 | 56 | 18 | 17 | 22 | 6 | 17 | 23 | | 3 | 12 | | | |
| JM | | 20 | 11 | 66 | 22 | 15 | 26 | 5 | 24 | 21 | | 4 | 16 | | | |
| HS | | 15 | 8 | 54 | 35 | 20 | 29 | 13 | 29 | 43 | | 1 | 22 | | | |
| KF | | 5 | 1 | 57 | 34 | 10 | 11 | 16 | 23 | 6 | | 2 | 26 | | | |
| ML | | 4 | | 58 | 5 | 16 | 28 | 15 | 13 | 17 | | 18 | 27 | | | |
| LR | | 27 | | 62 | 14 | 2 | 18 | 2 | 10 | 25 | | 8 | 29 | | | |
| NW | | 12 | | 64 | 10 | 3 | 14 | 22 | 4 | 14 | | 5 | 21 | | | |
| QK | | 17 | | 55 | 47 | 23 | 3 | 3 | 14 | 22 | | 9 | 9 | | | |
| PQ | | 7 | | 68 | 8 | 5 | 20 | 21 | 21 | 29 | | | 8 | | | |
| RV | | 28 | | 32 | 25 | 9 | 12 | 9 | 20 | 46 | | | 4 | | | |
| TJ | | 9 | | 72 | 9 | 19 | 9 | 14 | 25 | 9 | | | 3 | | | |
| SP | | 11 | | 80 | 1 | | 15 | 10 | 1 | 19 | | | 2 | | | |
| VT | | 30 | | 81 | 7 | | 30 | 20 | 30 | 44 | | | 1 | | | |
| WN | | 29 | | 73 | 6 | | 16 | 4 | 18 | 37 | | | 36 | | | |
| GH | | 8 | | 74 | 41 | | 5 | 26 | 9 | 47 | | | 37 | | | |
| JN | | 25 | | 79 | 29 | | 10 | | 12 | 36 | | | 38 | | | |
| HT | | 31 | | 77 | 3 | | | | 5 | 33 | | | 18 | | | |
| KG | | | | 75 | 44 | | | | 33 | 13 | | | 17 | | | |
| MM | | | | 76 | 23 | | | | 7 | 39 | | | 20 | | | |
| LS | | | | 78 | 11 | | | | 31 | 45 | | | 6 | | | |
| NF | | | | 36 | 2 | | | | 35 | 50 | | | 35 | | | |
| QL | | | | 45 | 32 | | | | 19 | 11 | | | 24 | | | |
| PR | | | | 44 | 36 | | | | | 8 | | | 11 | | | |
| RW | | | | 46 | 15 | | | | | 35 | | | 7 | | | |
| TK | | | | 24 | 31 | | | | | 2 | | | | | | |
| SQ | | | | 25 | 17 | | | | | 12 | | | | | | |
| VV | | | | 26 | 4 | | | | | 1 | | | | | | |
| WP | | | | 33 | 33 | | | | | 7 | | | | | | |
| GJ | | | | 43 | 38 | | | | | 38 | | | | | | |
| JP | | | | 31 | 19 | | | | | 48 | | | | | | |
| HV | | | | 42 | 39 | | | | | 40 | | | | | | |
| KH | | | | 40 | 42 | | | | | 28 | | | | | | |
| MN | | | | 21 | 37 | | | | | 32 | | | | | | |
| LT | | | | 12 | 27 | | | | | 10 | | | | | | |
| NG | | | | 37 | | | | | | 49 | | | | | | |
| QM | | | | 15 | | | | | | 20 | | | | | | |
| PS | | | | 17 | | | | | | | | | | | | |
| RF | | | | 13 | | | | | | | | | | | | |
| TL | | | | 19 | | | | | | | | | | | | |
| SR | | | | 16 | | | | | | | | | | | | |
| VW | | | | 18 | | | | | | | | | | | | |
| WQ | | | | 20 | | | | | | | | | | | | |
| GK | | | | 9 | | | | | | | | | | | | |
| JQ | | | | 14 | | | | | | | | | | | | |
| HW | | | | 11 | | | | | | | | | | | | |
| KJ | | | | 10 | | | | | | | | | | | | |
| MP | | | | 8 | | | | | | | | | | | | |
| LV | | | | 71 | | | | | | | | | | | | |
| NH | | | | 3 | | | | | | | | | | | | |
| QN | | | | 28 | | | | | | | | | | | | |
| PT | | | | 27 | | | | | | | | | | | | |
| RG | | | | 38 | | | | | | | | | | | | |
| TM | | | | 23 | | | | | | | | | | | | |
| SS | | | | 39 | | | | | | | | | | | | |
| VF | | | | 29 | | | | | | | | | | | | |
| WR | | | | 5 | | | | | | | | | | | | |
| VG | | | | 35 | | | | | | | | | | | | |
| WS | | | | 30 | | | | | | | | | | | | |
| VH | | | | 41 | | | | | | | | | | | | |
| WT | | | | 34 | | | | | | | | | | | | |
| VJ | | | | 48 | | | | | | | | | | | | |
| WV | | | | 4 | | | | | | | | | | | | |
| VK | | | | 7 | | | | | | | | | | | | |
| WW | | | | 51 | | | | | | | | | | | | |
| VL | | | | 6 | | | | | | | | | | | | |
| WF | | | | 50 | | | | | | | | | | | | |
| WG | | | | 22 | | | | | | | | | | | | |

(The example has been reduced for this thesis.)

## Appendix 4

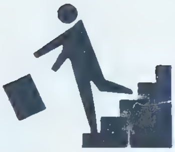
## A sample of computed output for the referent Beware of Steps

```
 THE RESULT FOR FAMILY "F" IS THE FOLLOWING
TOTAL OF FHR =      124
TOTAL OF FJL =      144
TOTAL OF FGF =      205
TOTAL OF FKW =      207
**********THE TOTAL AGREE**********    680
```

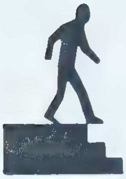
## Appendix 5
## Appropriateness Ranking Test Results

Referent: Beware of steps
Function: To indicate the presence of steps
Application: Occupational environments, Public places

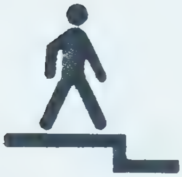
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



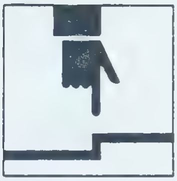
FHR
WCB
1
124



FJL
SaSo
2
144



FGF
SS
3
205

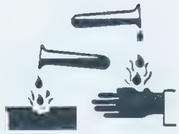


FKW
Aureli
4
207

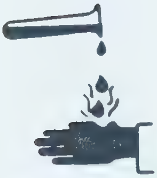
## Appendix 6
## Appropriateness Ranking Test Results

Referent: Corrosive
Function: To indicate the risk of contact with corrosive substances
Application: Occupational environments, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

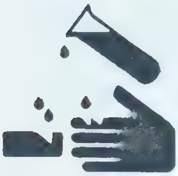
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



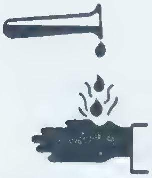
GGG
SIS, 1967
1
613



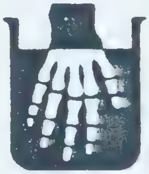
GML
FFA
2
655



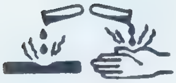
GQJ
Picto
3
695



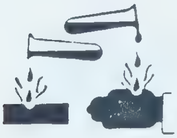
GNV
SIS, 1967
4
699



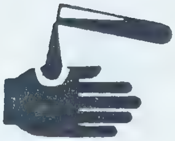
GHR
SS
5
702



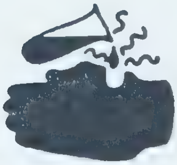
GKW
SaSo
6
774



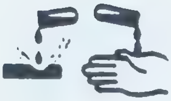
GKF
HISH
7
790



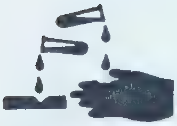
GWM
LSS, 1984
8
791



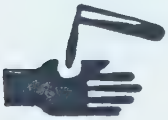
GPQ
Adkins
9
881



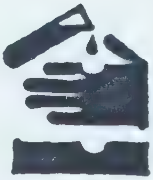
GTJ
Un
10
883



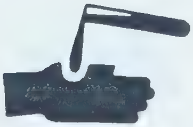
GSN
AS, 1983
11
900



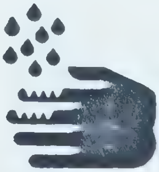
GSP
Un
12
949



GGH
UNI
13
949



GHS
Stone
14
1025

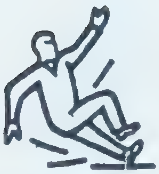


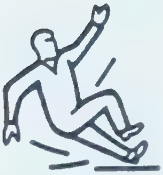
GJL
Pg
15
1031

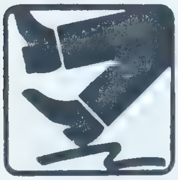
## Appendix 7
## Appropriateness Ranking Test Results

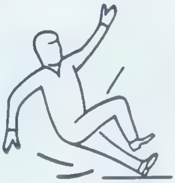
Referent: Slippery Floors
Function: To indicate the presence of slippery floor conditions
Note: this symbol is intended for temporary use only and shall only be displayed while the slippery condition exists
Application: Occupational environments, Public places

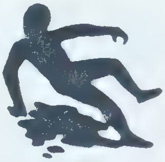
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

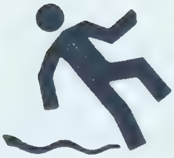

HRT
SW
1
359

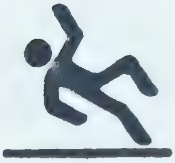

HPP
Dreyfuss
2
377

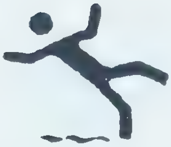

HWM
FMC
3
382

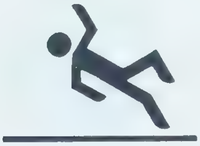

HQJ
SIS
4
394

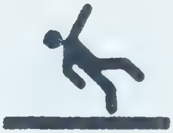

HNV
BS, 1982
5
418

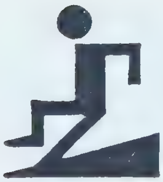

HHR
Brady, 1978
6
495

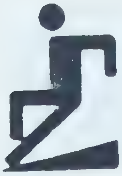

HHS
Un
7
558

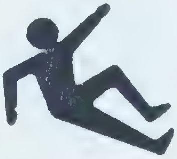

HMK
SLL, 1984
8
560

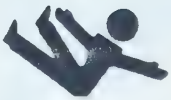

HGF
FIP, 1980
9
587

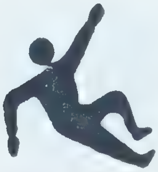

HJL
SS
10
677


HGG
Adkins
11
695


HJM
Dreyfuss
12
766


HLQ
SaSo
13
788

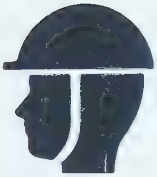

HVS
Brady, 1984
14
794

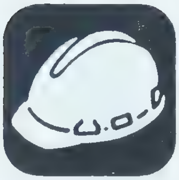

HKW
USDC
15
816

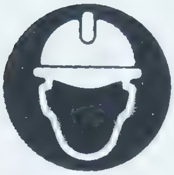
## Appendix 8
## Appropriateness Ranking Test Results

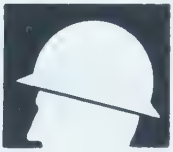
Referent: Hard Hat Required
Function: To indicate an area where the wearing of head protection is mandatory
Application: Occupational environments, Pieces of equipment

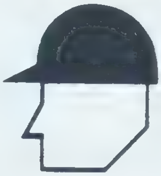
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

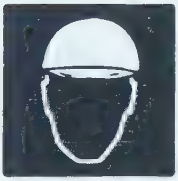

PJL
TFSP
1
462

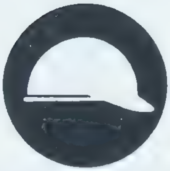

PKG
Willson
2
676

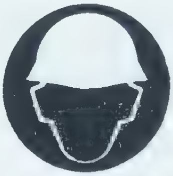

PWM
SS
3
689

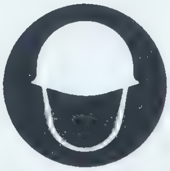

PMM
WCB
4
716

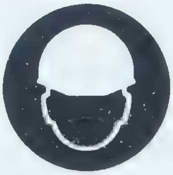

PLQ
NM
5
837

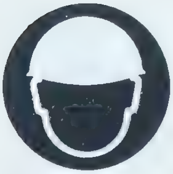

PQJ
PSS
6
1025

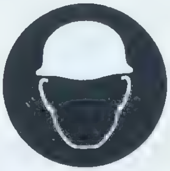

PKW
SABS, 1978
7
1031

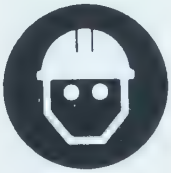

PRV
Stone
8
1057

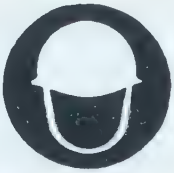

PNW
FIP, 1980
9
1073

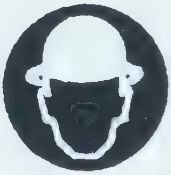

PLR
SSC, 1984
10
1086


PKF
Brady, 1978
11
1095


PPQ
BS, 1980
12
1103


PJN
Picto
13
1104

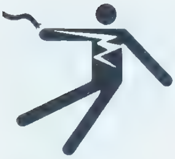

PHT
Un
14
1112

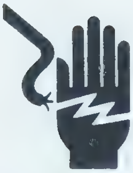

PQK
Letraset, 1983
15
1166

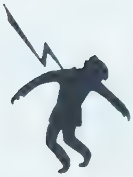
## Appendix 9
## Appropriateness Ranking Test Results

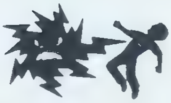
Referent: High Voltage
Function: To indicate the presence of electric current which may be a definite hazard
Application: Occupational environments, Public places, Pieces of equipment

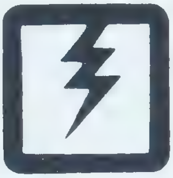
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

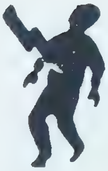

QPR
FMC
1
666

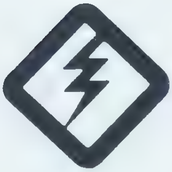

QTJ
FMC
2
789

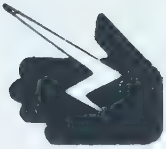

QKF
Un
3
897

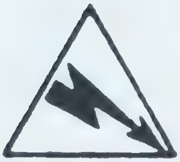

QNF
Brady, 1984
4
977

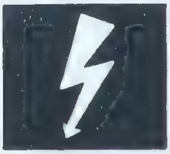

QNW
KPIE
5
1036

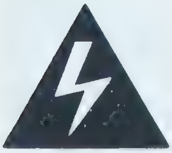

QQL
ADI
6
1071

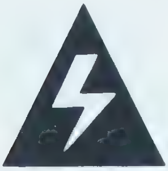

QJN
OD
7
1076

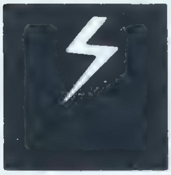

QWP
PS
8
1134

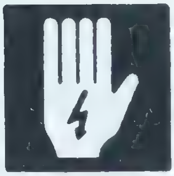

QVV
SEMEX
9
1368

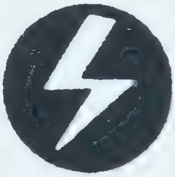

QTK
WCB
10
1393


QMK
FIP
11
1488


QJL
SSC, 1976
12
1489


QHS
O'76
13
1491

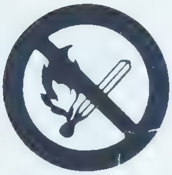

QLT
T&B
14
1511

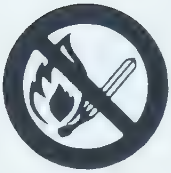

QSQ
LSS
15
1556

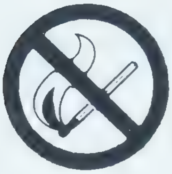
## Appendix 10
## Appropriateness Ranking Test Results

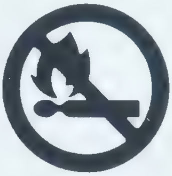
Referent: No Open Flame
Function: To indicate fire, naked flame and smoking prohibited
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

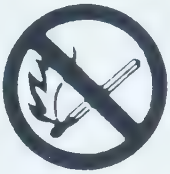
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

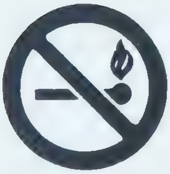

SML
ISO
1
482

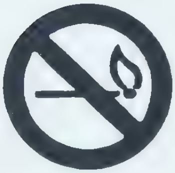

SSN
SABS
2
510

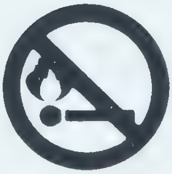

SWM
BTLC
3
525

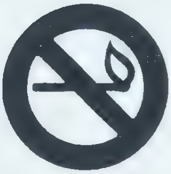

SJL
Picto
4
558

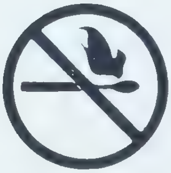

SVS
Focal
5
598

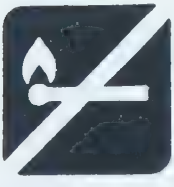

SQJ
PSS
6
648

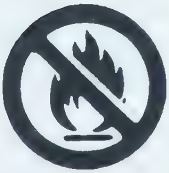

SNV
USDC
7
670

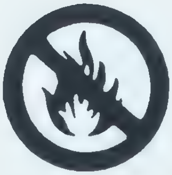

SHR
Brady, 1978
8
681

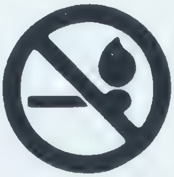

SLQ
O'76
9
705

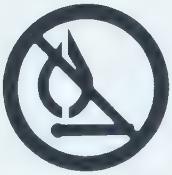

SPP
NM
10
740


SGF
UBP, 1980
11
747

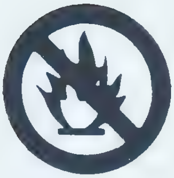

SHS
SS
12
796

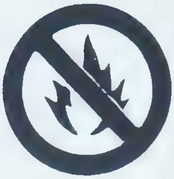

SGG
SaSo
13
801

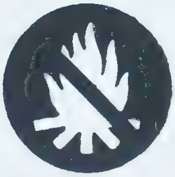

SRT
KPIE
14
809

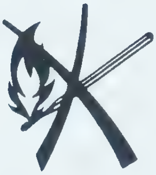

SMK
LSC
15
840

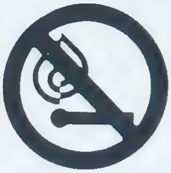
## Appendix 11
## Appropriateness Ranking Test Results

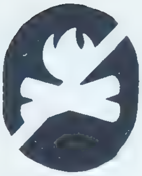

SKF
Un
16
851

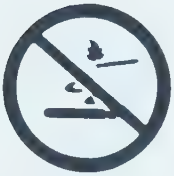

SJM
Stone
17
897


SNW
Un
18
927


SLR
SIS
19
1031


SKW
SSC
20
1046


SQK
CNSS
21
1050

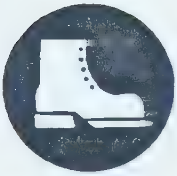

STH
ADI
22
1292

Appendix 12

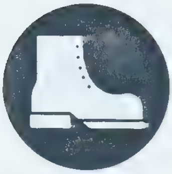
## Appropriateness Ranking Test Results

Referent: Foot Protection Required
Function: To indicate an area where the wearing of foot protection is mandatory
Application: Occupational environments

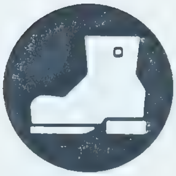
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



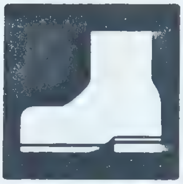
MRT
Un
1
601



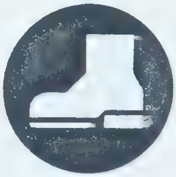
MMK
FIP, 1980
2
631



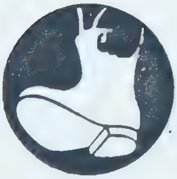
MQK
NBN, 1983
3
646



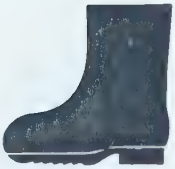
MGF
PSS
4
659



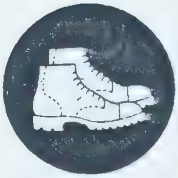
MGH
SSC, 1984
5
685



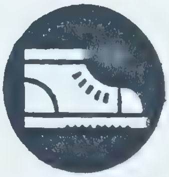
MJL
USDC
6
687



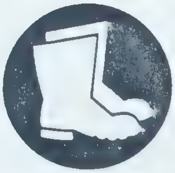
MGG
TFSP
7
802



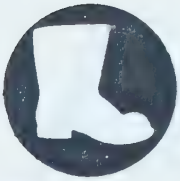
MTH
SHBS, 1978
8
805



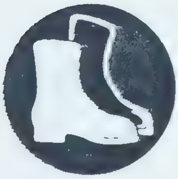
MHS
UNI
9
831



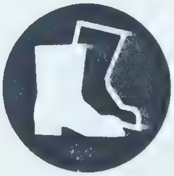
MPQ
SABS, 1978
10
833



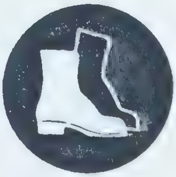
MPP
USDC
11
868



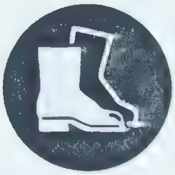
MTJ
SS
12
892



MKF
NBN, 1983
13
950



MRV
DS, 1981
14
950

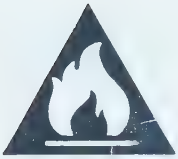


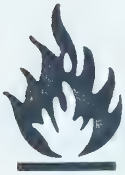
MJN
BS, 1980
15
973

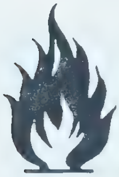
## Appendix 13
## Appropriateness Ranking Test Results

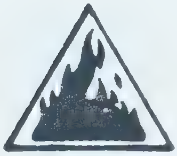
Referent: Flammable
Function: To indicate the presence of a flammable substance
Application: Occupational environments, Public places, Vehicles, Containers of products, Catalogues and other publications

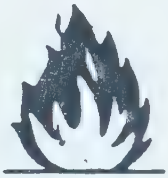
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

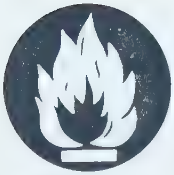

NJM
LSL
1
662

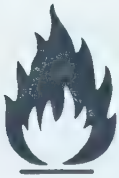

NKF
SaSo
2
683

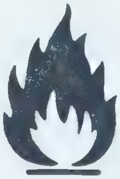

NPP
HISH
3
695

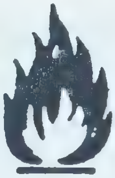

NLR
SEMEX
4
697

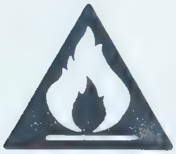

NRV
FFA
5
709

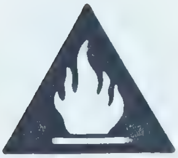

NTH
MSA
6
721

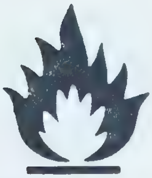

NHS
FFA
7
726

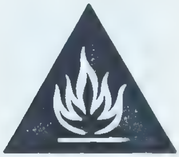

NLQ
Un
8
739

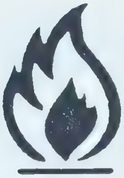

NSP
ISO, 1984
9
747

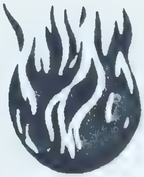

NWN
Brady, 1978
10
805


NQK
CSAO, 1984
11
807


NPQ
BS, 1980
12
809


NGG
FIP, 1980
13
853

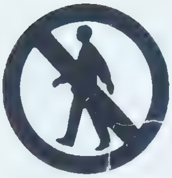

NTJ
SABS, 1978
14
898

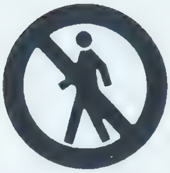

NMK
Best
15
908

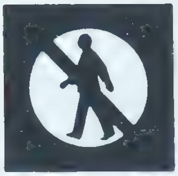
## Appendix 14
## Appropriateness Ranking Test Results

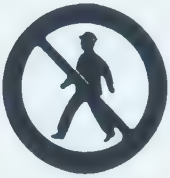
Referent: No Trespassing
Function: To indicate an area of restricted access
Application: Occupational environments, Public places

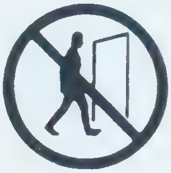
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

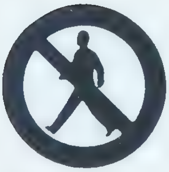

JSR
SaSo
1
1197

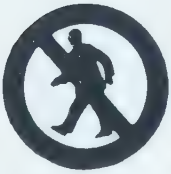

JQM
SABS, 1978
2
1333

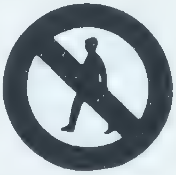

JLT
Mod/ICAO
3
1346

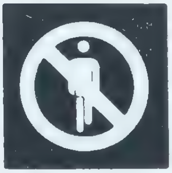

JWQ
MSA
4
1384

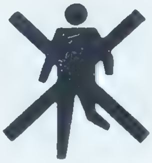

JMN
NM
5
1444

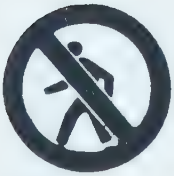

JRF
FFA
6
1523

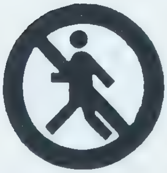

JGK
Eas/ISO, 1975
7
1543

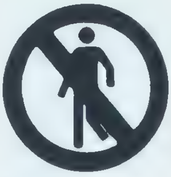

JTL
Eas/CSN, 1966
8
1560

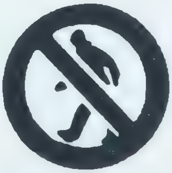

JVV
O'76
9
1628

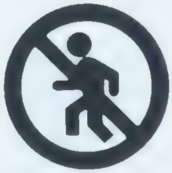

JNH
WCB
10
1632


JPS
Stone
11
1690


JMP
UNI
12
1692


JNG
Dreyfuss
13
1693


JJQ
Un
14
1706

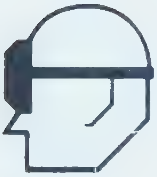

JKJ
Picto
15
1711

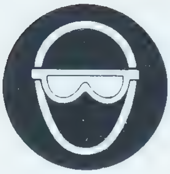
## Appendix 15

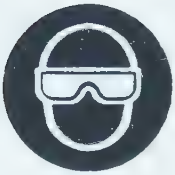
## Appropriateness Ranking Test Results

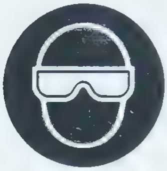
Referent: Eye Protection Required
Function: To indicate an area where the wearing of eye protection is mandatory
Application: Occupational environments, Pieces of equipment

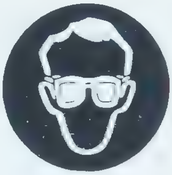
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

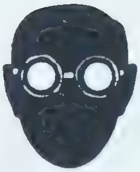

KSP
NM
1
861

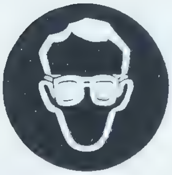

KTH
CSAO, 1984
2
973

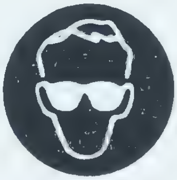

KLS
Un
3
1014

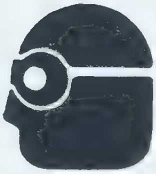

KHR
FIP, 1980
4
1069

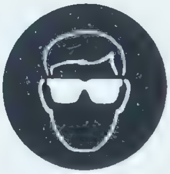

KPR
DS, 1981
5
1157

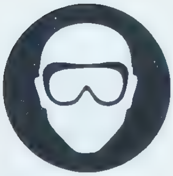

KSN
WCB
6
1234

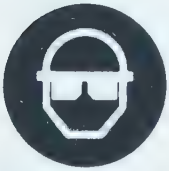

KKF
ISO, 1984
7
1253

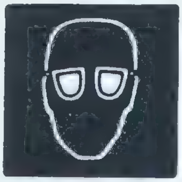

KRT
BS, 1980
8
1274

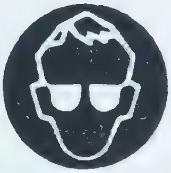

KNW
LSS, 1984
9
1294

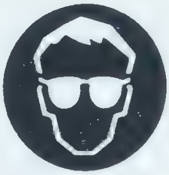

KRV
BS, 1980
10
1295


KHT
LSL
11
1296

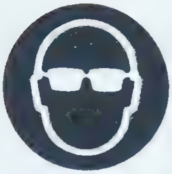

KJP
Picto
12
1318

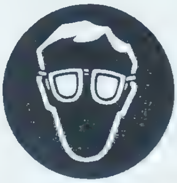

KMM
PSS
13
1326

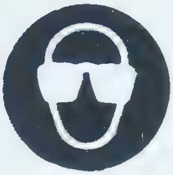

KJN
Un
14
1342

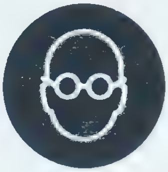

KMN
NBN, 1983
15
1361

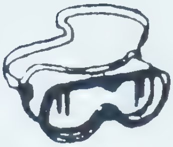
## Appendix 16
## Appropriateness Ranking Test Results

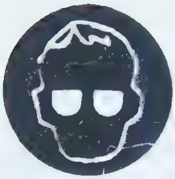

KRW
Brady, 1978
16
1362

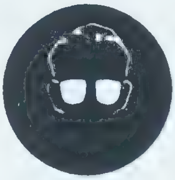

KWP
MSA
17
1368

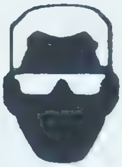

KLR
SS
18
1375

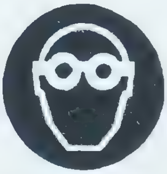

KLT
SSC, 1984
19
1416

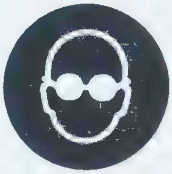

KVT
SEMEX
20
1458

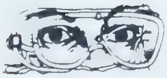

KLQ
Un
21
1459

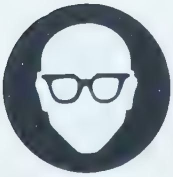

KJM
SSI
22
1461

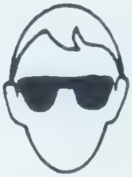

KSQ
Brady, 1978
23
1472

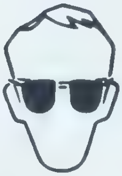

KQJ
UNI
24
1490

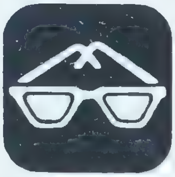

KHS
SSC, 1976
25
1579

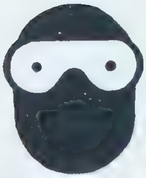

KWN
Mar
26
1584

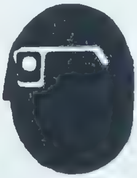

KNV
LSL
27
1618

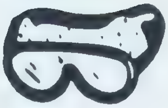

KTK
SaSo
28
1657

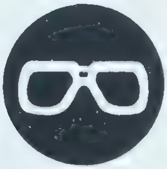

KHV
FFA
29
1702

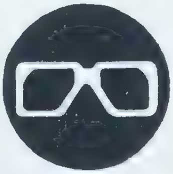

KVS
Willson
30
1750


KTJ
T&B, 1984
31
1765


KNF
SSC, 1984
32
1811


KML
USDC
33
1822

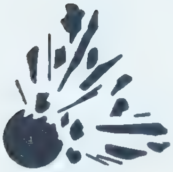

KGG
SABS, 1978
34
1923

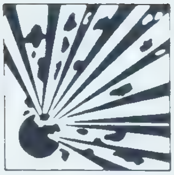

KVV
KT
35
1988

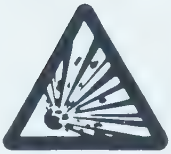
## Appendix 17
## Appropriateness Ranking Test Results

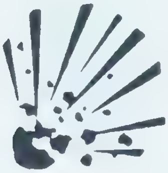
Referent: Explosive
Function: To indicate the risk of explosion
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

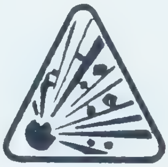
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

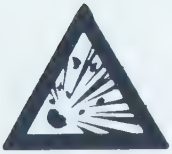

LWM
Un
1
426

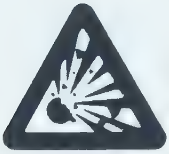

LVS
Un
2
442

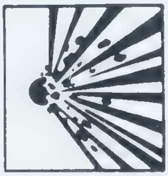

LJM
AS, 1983
3
518

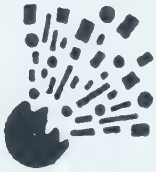

LLR
Un
4
556

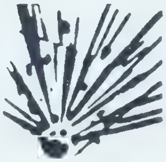

LKW
SS
5
565

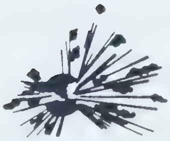

LMK
SABS, 1978
6
600

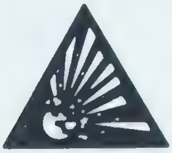

LPP
Picto
7
616

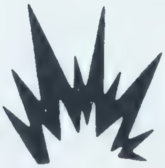

LJC
Collins
8
655

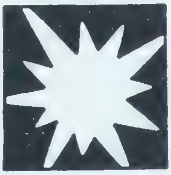

LNW
UNI
9
666

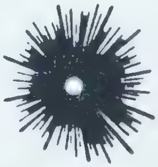

LNV
Un
10
670


LRV
SIS, 1967
11
698


LTJ
FIP, 1980
12
749


LGG
FMC
13
857


LML
IVDS, 1974
14
886

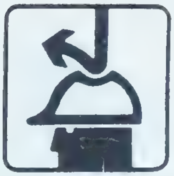

LSN
Brady, 1984
15
977

## Appendix 18

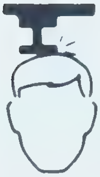
## Appropriateness Ranking Test Results

Referent: Overhead Hazard
Function: To indicate the risk of overhead hazard in designated areas
Application: Occupational environments

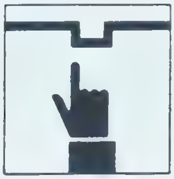
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



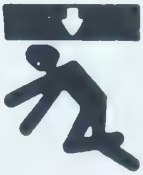
RGF
FMC
1
167



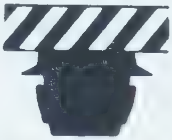
RJL
BS, 1982
2
188



RMK
Aureli
3
209

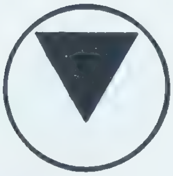


RHR
Stone
4
259



RLQ
WCB
5
278

RNV
T&B, 1984
6
344



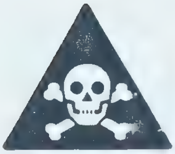
RKW
USDC
7
459

## Appendix 19

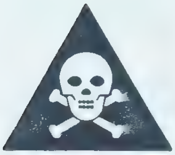
## Appropriateness Ranking Test Results

Referent: Poison
Function: To indicate the presence of a poisonous substance
Application: Occupational environments, Public places, Vehicles, Containers of products, Catalogues and other publications

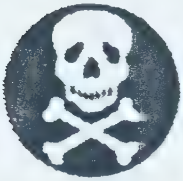
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



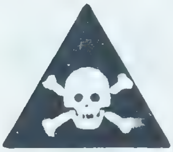
TVT
Brady, 1984
1
658



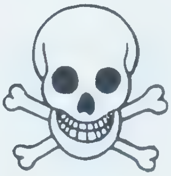
TTJ
FIP
2
672



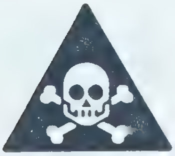
THS
LSS
3
675



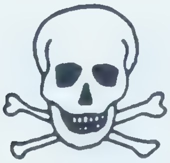
TSP
SSC
4
699



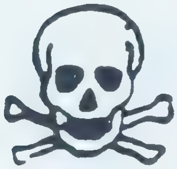
TKG
Un
5
728



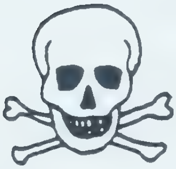
TRV
SSC
6
777



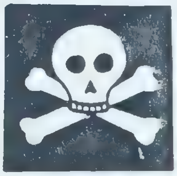
TTH
DS
7
801



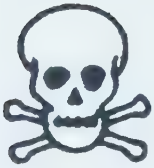
THT
Un
8
825



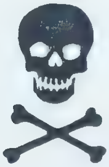
TPR
ISO, 1984
9
854



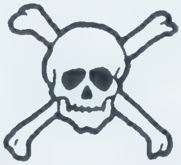
TLS
Un
10
895



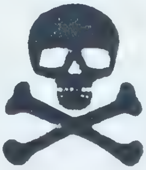
TMM
Un
11
1013



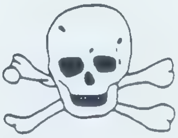
TRK
Dreyfuss
12
1024



TSN
Adkins
13
1025



TPQ
SS
14
1094

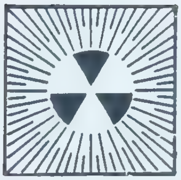


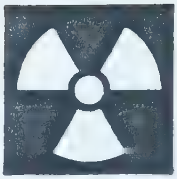
TGG
Stone
15
1096

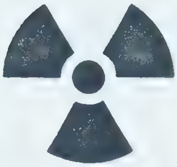
## Appendix 20
## **Appropriateness Ranking Test Results**

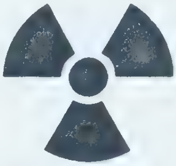
Referent: Radiation
Function: To indicate the actual or potential presence of ionizing radiation and to identify objects, devices, materials or combinations of materials which emit ionizing radiation
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

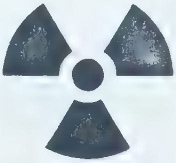
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

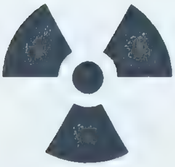

UNV
ERCO
1
133

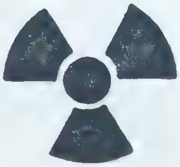

UQJ
Un
2
254

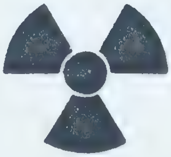

UJL
SIS, 1967
3
300


UMK
Ur/FUB
4
326


UKW
FFA
5
331


UGF
LSL
6
361


UHR
Brady, 1978
7
364

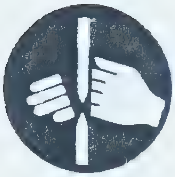

ULQ
Un
8
379

Appendix 21

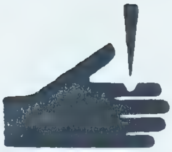
## Appropriateness Ranking Test Results

Referent: Sharp Edge
Function: To indicate the risk implied by sharp objects or cutting edges or blades
Application: Occupational environments, Pieces of equipment

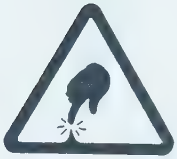
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50



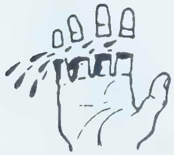
VMK
KT
1
165



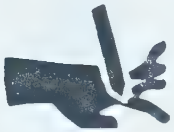
VGF
Dreyfuss
2
251



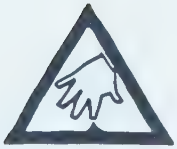
VNV
Adkins
3
256



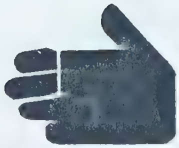
VHR
Mar
4
275



VJL
Stone
5
283



VLQ
Dreyfuss
6
320



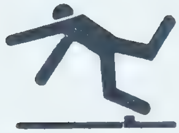
VKW
PS
7
354

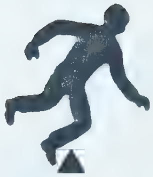
Appendix 22

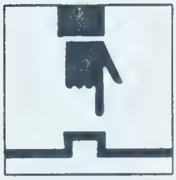
## Appropriateness Ranking Test Results

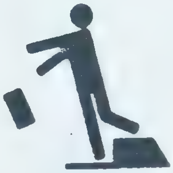
Referent: Trip Hazard
Function: To indicate the risk of tripping in designated areas
Application: Occupational environments, Public places, Vehicles (railway car, ferry boat, boarding ramp, etc.)

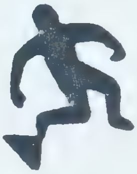
Country: Canada and Chile
Sample Size: 68
Age Range: Under 30 and Over 50

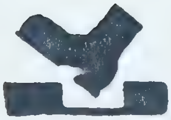

WMK
Stone
1
149

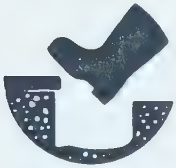

WHR
BS
2
180

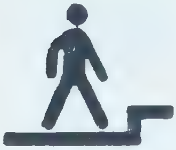

WQJ
Aureli
3
288


WNV
Dreyfuss
4
291


WKW
Un
5
355


WJL
SCC
6
386

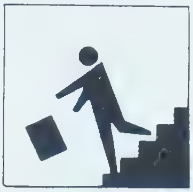

WGF
USDC
7
389

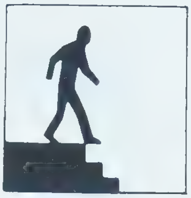

WLQ
SS
8
410

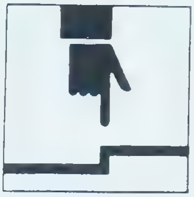
## Appendix 23

## Selected Symbols for Comprehension/Recognition Test

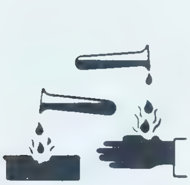
### Beware of Steps

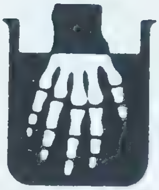

WCB

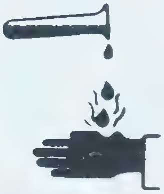

SaSo


Aureli

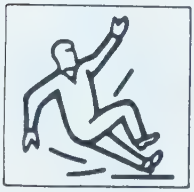
### Corrosive

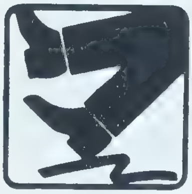

SIS'67

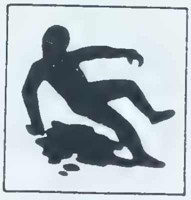

SS


SIS'67

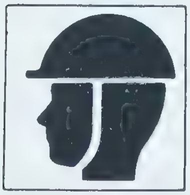
### Slippery Floor

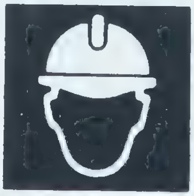

Dreyfuss

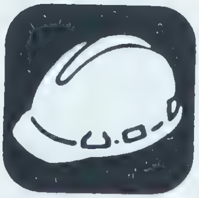

FMC


BS'82

### Hard Hat Required

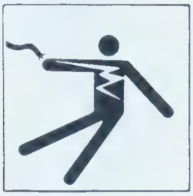

TFSP

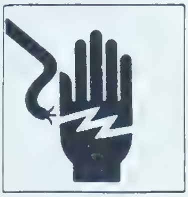

SS

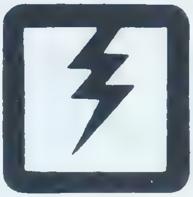

Willson

## Appendix 24
# Selected Symbols for Comprehension/Recognition Test

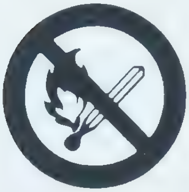
### High Voltage

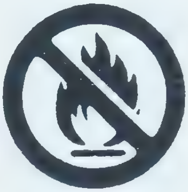

FMC

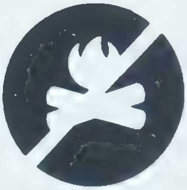

FMC


KPIE’81

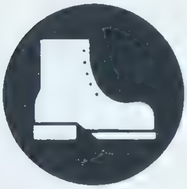
### No Open Flame

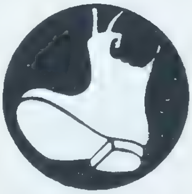

ISO’84

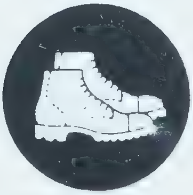

SS


CNSS

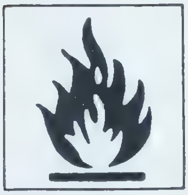
### Foot Protection Required

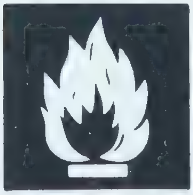

Un

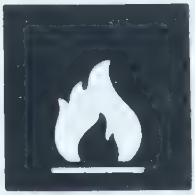

USDC


SABS’78

### Flammable

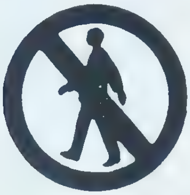

SaSo

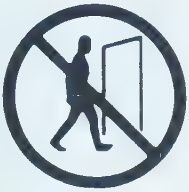

MSA

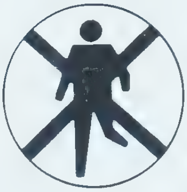

LSL

## Appendix 25
## Selected Symbols for Comprehension/Recognition Test

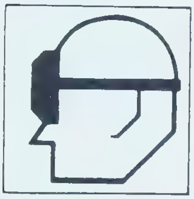
### No Trespassing

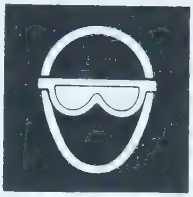

SaSo

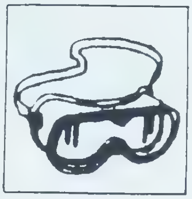

NM


WCB

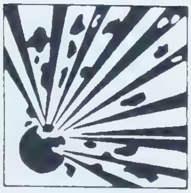
### Eye Protection Required

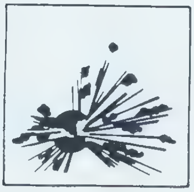

NM

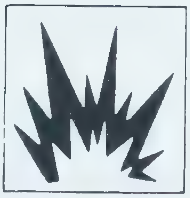

CSAO'84


SEMEX

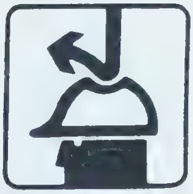
### Explosive

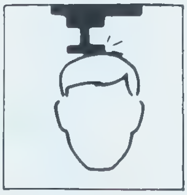

Un

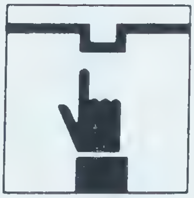

SIS'67


FMC

### Overhead Hazard


FMC

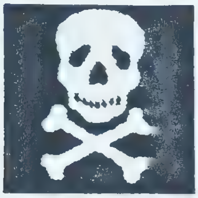

BS'82

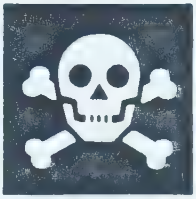

Aureli

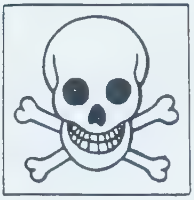
## Appendix 26

## Selected Symbols for Comprehension/Recognition Test

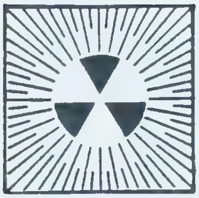
### Poison

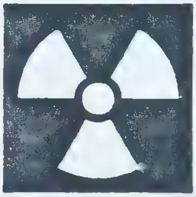

LSS

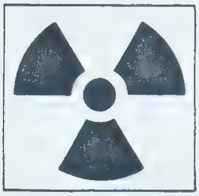

Brady '84


Un

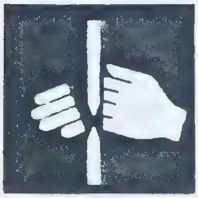
### Radiation

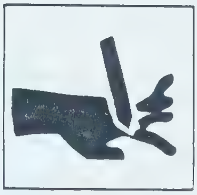

ERCO

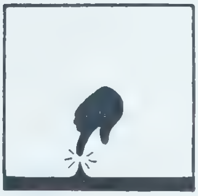

Un


FFA

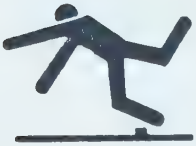
### Sharp Edge

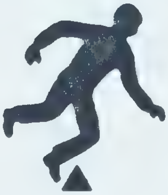

KT

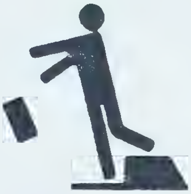

FMC


Adkins

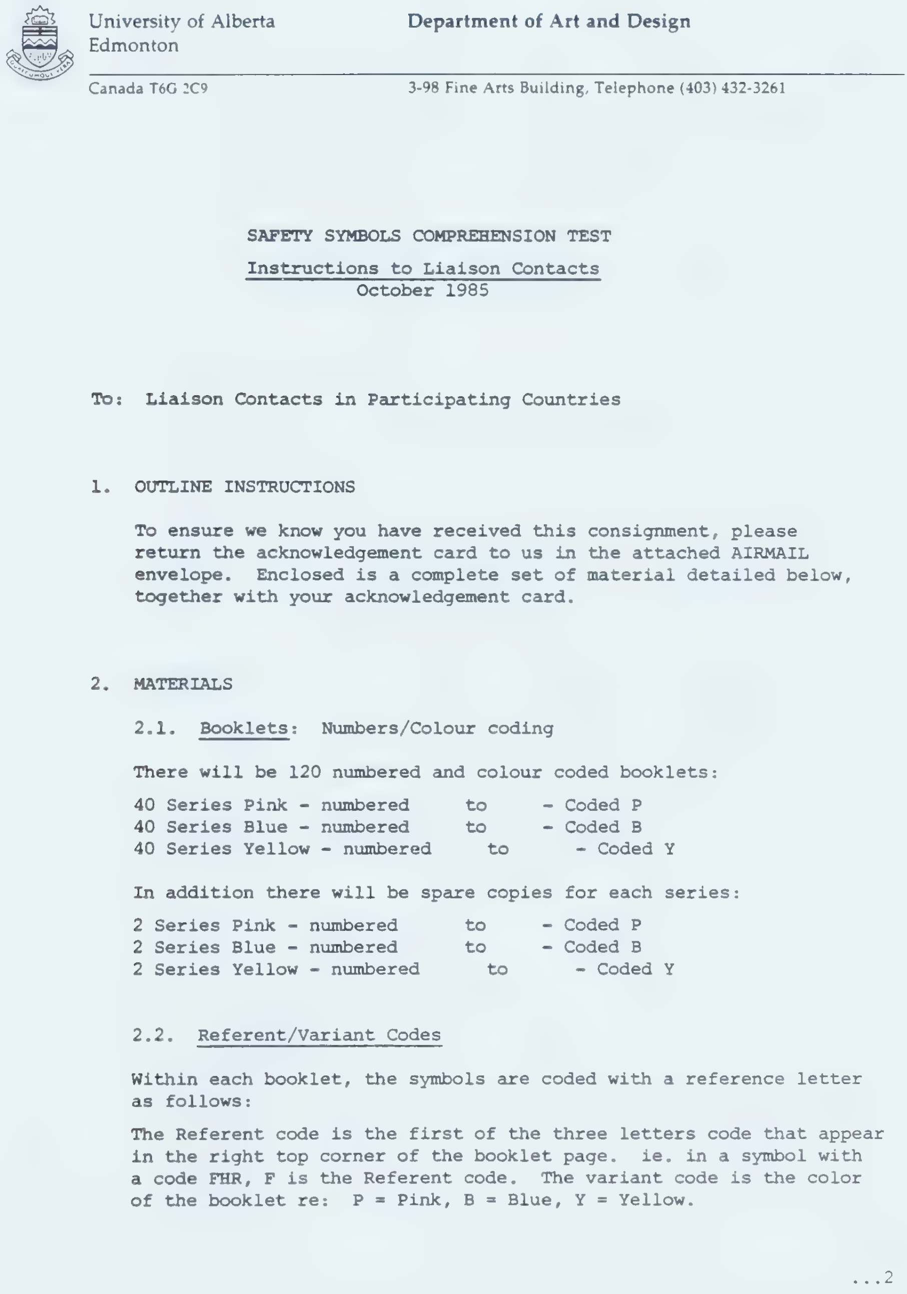
### Trip Hazard


Stone


BS '82


Dreyfuss

## Appendix 27
## Instructions to liaison contacts for Comprehension Test



University of Alberta
Edmonton
Canada T6G 2C9

**Department of Art and Design**
3-98 Fine Arts Building, Telephone (403) 432-3261

SAFETY SYMBOLS COMPREHENSION TEST

Instructions to Liaison Contacts
October 1985

To: Liaison Contacts in Participating Countries

1. OUTLINE INSTRUCTIONS

To ensure we know you have received this consignment, please return the acknowledgement card to us in the attached AIRMAIL envelope. Enclosed is a complete set of material detailed below, together with your acknowledgement card.

2. MATERIALS

2.1. Booklets: Numbers/Colour coding

There will be 120 numbered and colour coded booklets:

40 Series Pink - numbered to - Coded P
40 Series Blue - numbered to - Coded B
40 Series Yellow - numbered to - Coded Y

In addition there will be spare copies for each series:

2 Series Pink - numbered to - Coded P
2 Series Blue - numbered to - Coded B
2 Series Yellow - numbered to - Coded Y

2.2. Referent/Variant Codes

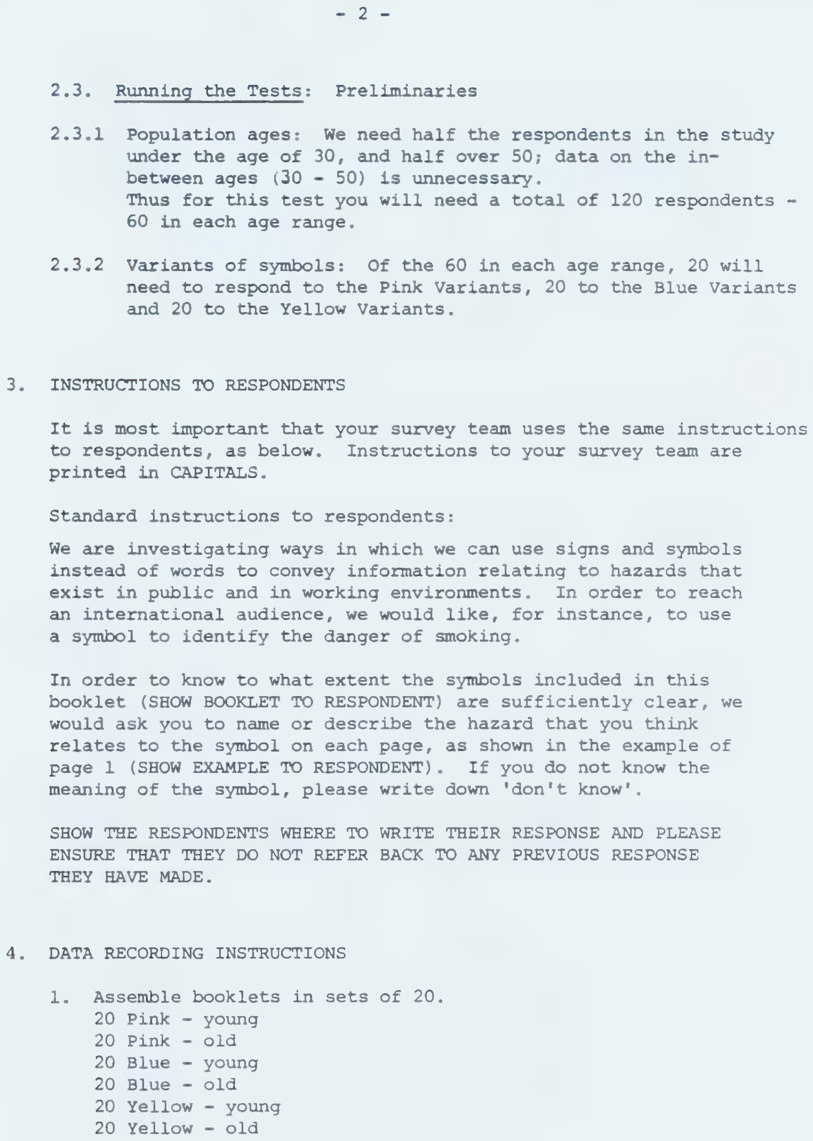
Within each booklet, the symbols are coded with a reference letter as follows:

The Referent code is the first of the three letters code that appear in the right top corner of the booklet page. ie. in a symbol with a code FHR, F is the Referent code. The variant code is the color of the booklet re: P = Pink, B = Blue, Y = Yellow.

...2

(The example has been reduced for this thesis.)

## Appendix 28
## Instructions to liaison contacts for Comprehension Test



- 2 -

2.3. Running the Tests: Preliminaries

2.3.1 Population ages: We need half the respondents in the study under the age of 30, and half over 50; data on the in-between ages (30 - 50) is unnecessary.
Thus for this test you will need a total of 120 respondents - 60 in each age range.

2.3.2 Variants of symbols: Of the 60 in each age range, 20 will need to respond to the Pink Variants, 20 to the Blue Variants and 20 to the Yellow Variants.

3. INSTRUCTIONS TO RESPONDENTS

It is most important that your survey team uses the same instructions to respondents, as below. Instructions to your survey team are printed in CAPITALS.

Standard instructions to respondents:

We are investigating ways in which we can use signs and symbols instead of words to convey information relating to hazards that exist in public and in working environments. In order to reach an international audience, we would like, for instance, to use a symbol to identify the danger of smoking.

In order to know to what extent the symbols included in this booklet (SHOW BOOKLET TO RESPONDENT) are sufficiently clear, we would ask you to name or describe the hazard that you think relates to the symbol on each page, as shown in the example of page 1 (SHOW EXAMPLE TO RESPONDENT). If you do not know the meaning of the symbol, please write down 'don't know'.

SHOW THE RESPONDENTS WHERE TO WRITE THEIR RESPONSE AND PLEASE ENSURE THAT THEY DO NOT REFER BACK TO ANY PREVIOUS RESPONSE THEY HAVE MADE.

4. DATA RECORDING INSTRUCTIONS

1. Assemble booklets in sets of 20.
   20 Pink - young
   20 Pink - old
   20 Blue - young
   20 Blue - old
   20 Yellow - young
   20 Yellow - old

(The example has been reduced for this thesis.)

## Appendix 29
## Instructions to liaison contacts for Comprehension Test

Sorting the Data

2. The first task is to re-sort all the pages of the booklets. (The symbols in the test booklets provided will be arranged in random order to balance out serial effects in the responses; for convenience in recording however, this extra preliminary effort in rearranging the material will be amply repaid).

3. Take a set of 20 booklets and unstaple all of them.

4. Sort the booklets pages into 16 piles, one pile for each referent. All the pages in a given pile should have the same referent code and be of the same colour.

5. Label each of these 16 piles with the referent code and age group. Tie or bind each referent pile to keep it together.

6. Take each of the other five sets of booklets in turn and repeat steps 3 to 5.

7. This completes the preliminary sorting of the data. You should now have 6 sets of 20 responses for each of the 16 referents, 1-16. You are now ready to summarize the data.

Summarizing the Data

8. We have provided summary sheets for the data. There are four sheets per age group of one color. Take a summary sheet for the first referent.

9. Take a set of 20 responses for the first referent and record them in the appropriate colour summary and age group sheet using the spaces provided.
NB. First translate into English if necessary.

10. For the same referent, and with a new summary sheet for each set, repeat the procedure for the other 5 sets.

11. Now repeat the procedure 8 through 10 for the other 15 referents.

12. Arrange the summary sheets in order; you should have 6 x 4 = 24 summary sheets (ie. one sheet for 4 groups of 20 responses). Check the total number of sheets.

13. Return summary sheets to us AIRMAIL by January 31, 1986, and the unstapled booklets under separate cover to:

Jorge Frascara
Art and Design
University of Alberta
Edmonton, Alberta
T6G 2C9 CANADA

(The example has been reduced for this thesis.)

## Appendix 30
## Instructions to liaison contacts for Comprehension Test

15. Send us a separate letter (or Telex 0372979 FRASCARA ART) indicating you have dispatched results. This will help us keep track of any postal delays. We will acknowledge receipt of your mailing.

Jorge Frascara/Tony Yau
University of Alberta

APPENDIX 1

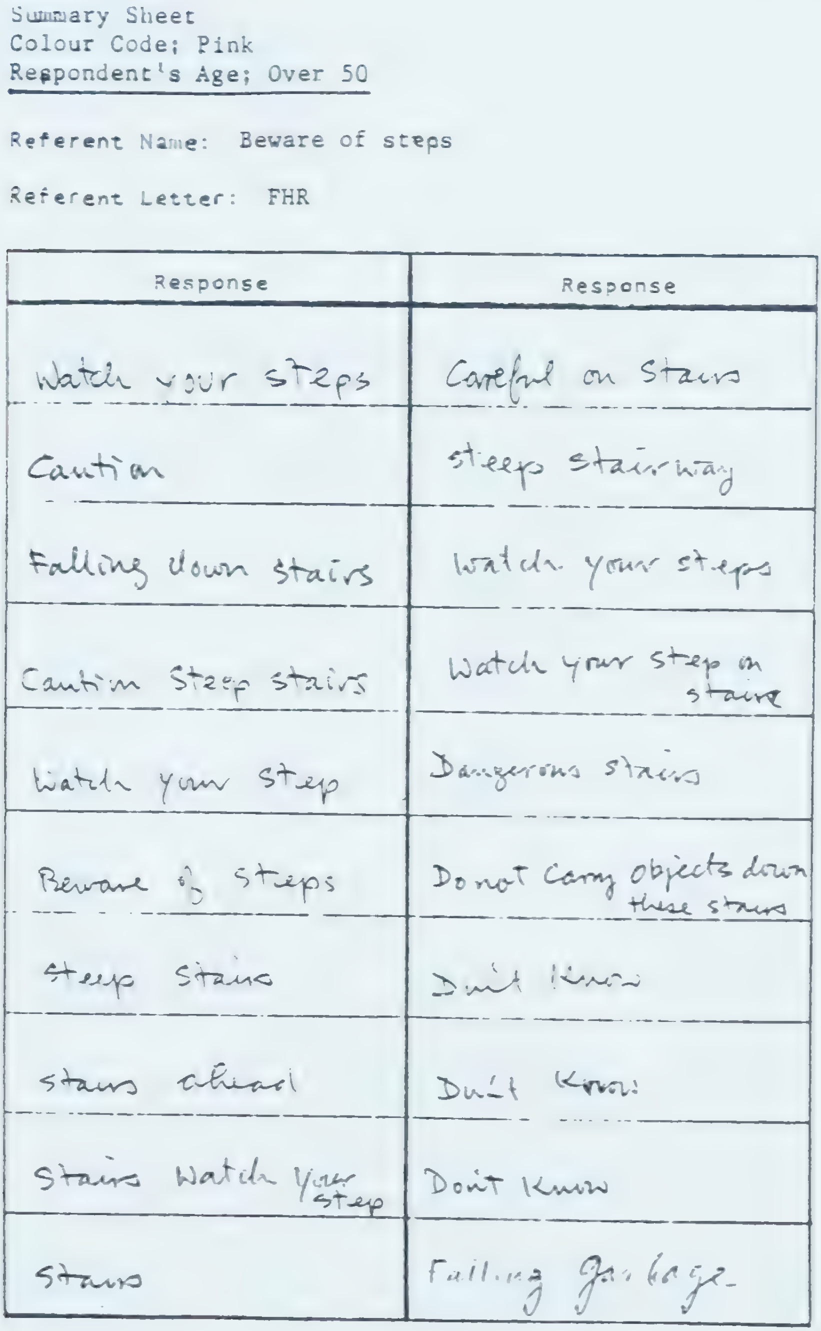
Referents

| | | |
|---|---|---|
| beware of steps | F | (4 cards) |
| corrosive | G | (31 cards) |
| slippery floor | H | (18 cards) |
| no trespassing | J | (81 cards) |
| eye protection required | K | (48 cards) |
| explosive | L | (25 cards) |
| foot protection required | M | (30 cards) |
| flammable | N | (29 cards) |
| hard hat required | P | (36 cards) |
| high voltage | Q | (50 cards) |
| overhead hazard | R | (7 cards) |
| no open flame | S | (22 cards) |
| poison | T | (38 cards) |
| radiation | U | (8 cards) |
| sharp edge | V | (7 cards) |
| trip hazard | W | (8 cards) |

(The example has been reduced for this thesis.)

Appendix 31

## A sample of summary sheet (from Canada) for the referent Beware of Steps



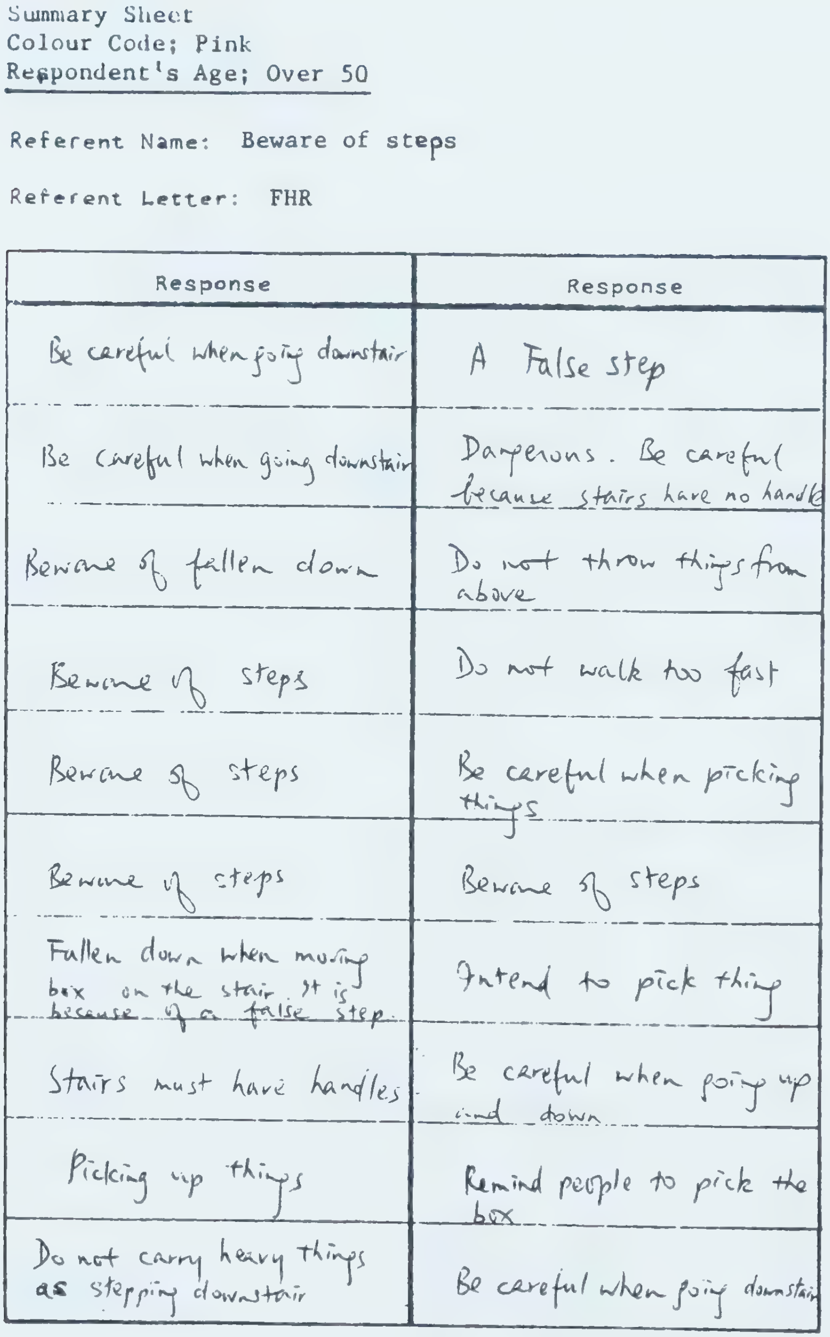
Summary Sheet
Colour Code; Pink
Respondent's Age; Over 50

Referent Name: Beware of steps

Referent Letter: FHR

| Response | Response |
|---|---|
| Watch your steps | Careful on Stairs |
| Caution | steep stairway |
| Falling down stairs | Watch your steps |
| Caution Steep stairs | Watch your step on stairs |
| Watch your step | Dangerous stairs |
| Beware of steps | Do not carry objects down these stairs |
| steep stairs | Don't know |
| stairs ahead | Don't Know |
| Stairs Watch your step | Don't Know |
| Stairs | Falling garbage |

## Appendix 32
## A sample of summary sheet (from Hong Kong) for the referent Beware of Steps



Summary Sheet
Colour Code; Pink
Respondent's Age; Over 50

Referent Name: Beware of steps

Referent Letter: FHR

| Response | Response |
|---|---|
| Be careful when going downstair | A False step |
| Be careful when going downstair | Dangerous. Be careful because stairs have no handle |
| Beware of fallen down | Do not throw things from above |
| Beware of steps | Do not walk too fast |
| Beware of steps | Be careful when picking things |
| Beware of steps | Beware of steps |
| Fallen down when moving box on the stair. It is because of a false step. | Intend to pick thing |
| Stairs must have handles | Be careful when going up and down |
| Picking up things | Remind people to pick the box |
| Do not carry heavy things as stepping downstair | Be careful when going downstair |

## Appendix 33
## A sample of summary sheet (from Hungary) for the referent Beware of Steps

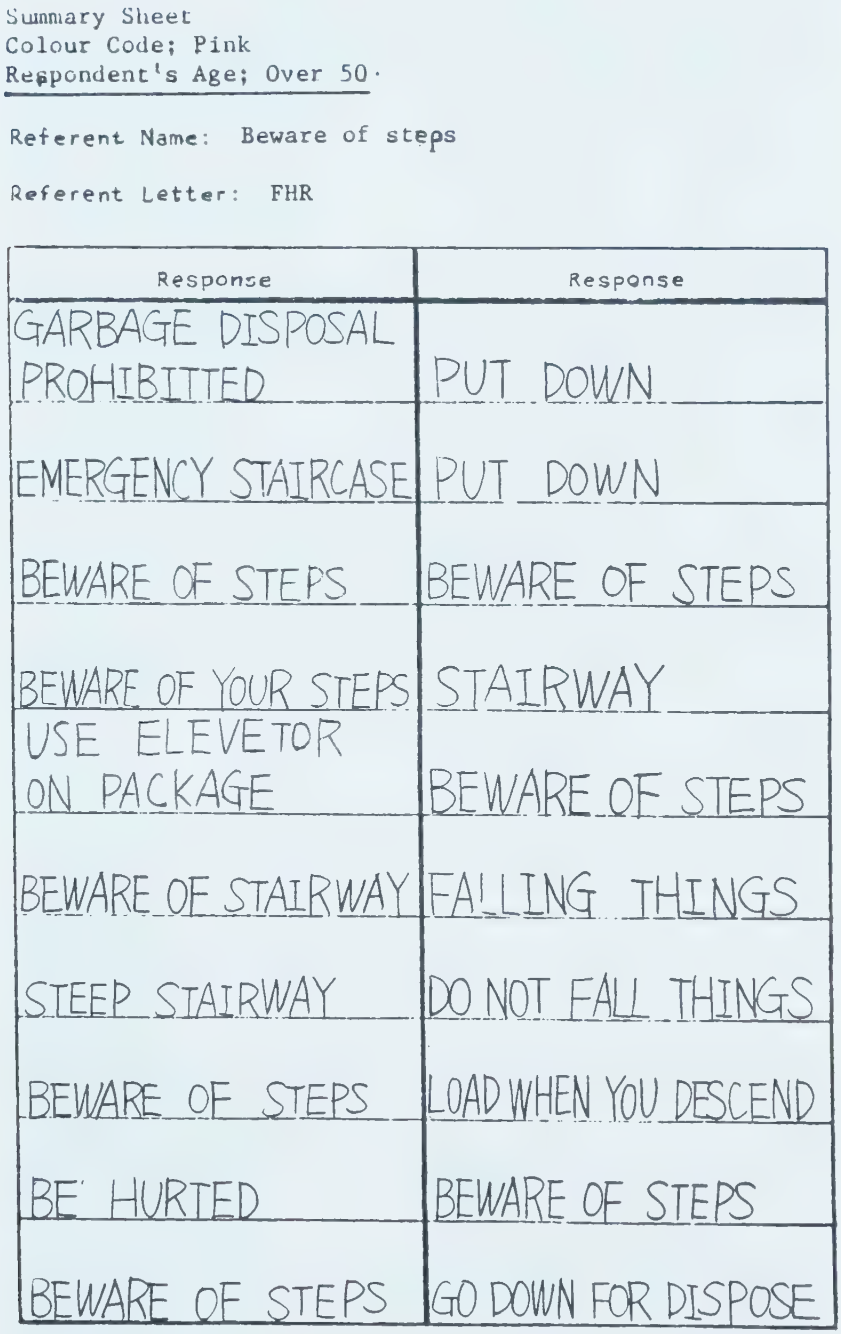
Summary Sheet
Colour Code; Pink
Respondent's Age; Over 50

Referent Name: Beware of steps

Referent Letter: FHR

| Response | Response |
|---|---|
| Stairs. | It is dongerous dowwards, too. |
| Beware of accidents. | High steps. |
| Do not know. | Dangerous stairs. |
| Do not know. | Slippery stairs. |
| Slippery steps. | Do not know. |
| Do not know. | High steps. |
| Do not know. | Do not know. |
| Do not throw garbage into the river. | Do not know. |
| Falling off the stairs. | Do not know. |
| Beware! | Working area. |

## Appendix 34
## A sample of summary sheet (from Japan) for the referent Beware of Steps



Summary Sheet
Colour Code; Pink
Respondent's Age; Over 50

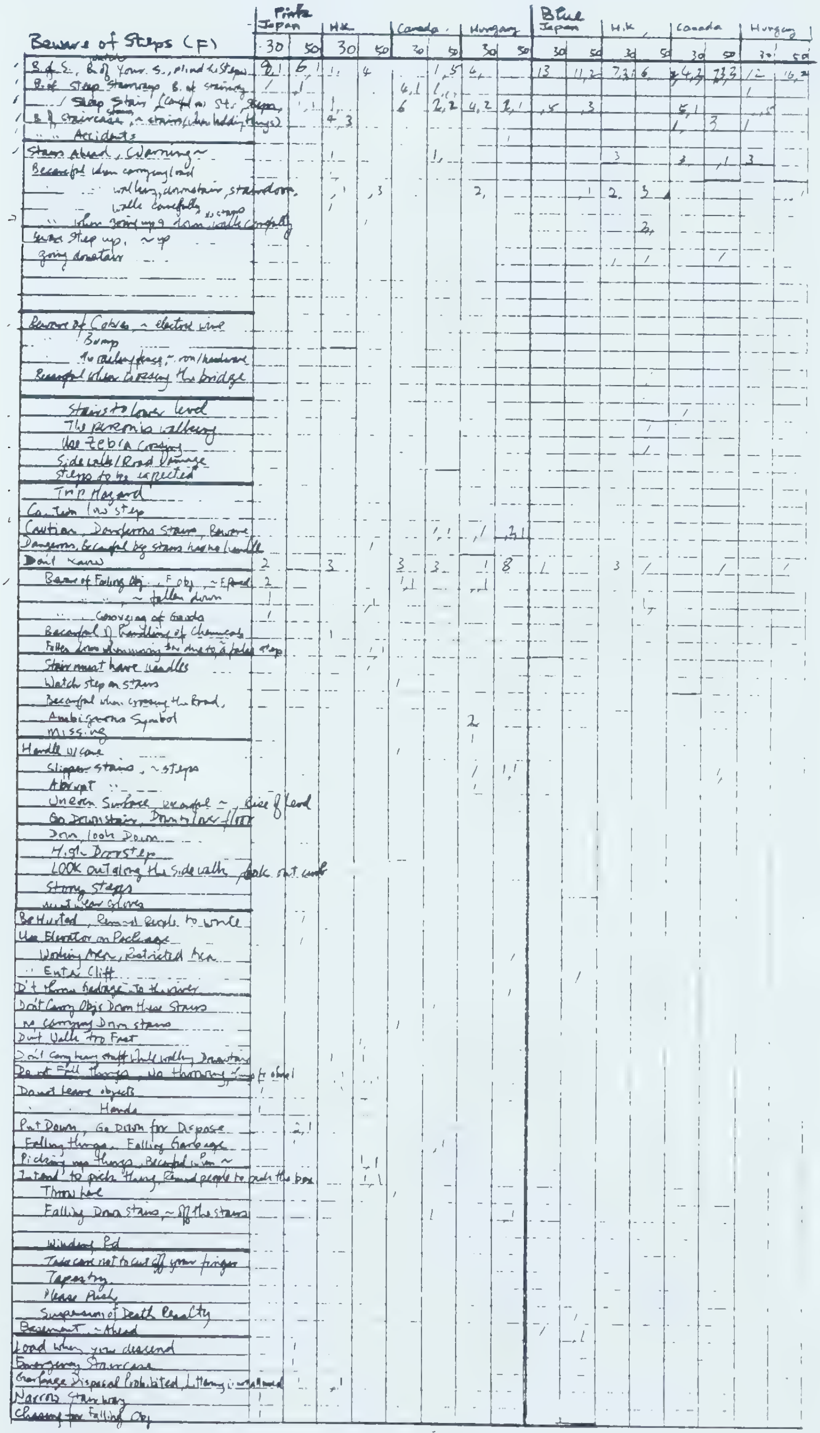
Referent Name: Beware of steps

Referent Letter: FHR

| Response | Response |
|---|---|
| GARBAGE DISPOSAL PROHIBITTED | PUT DOWN |
| EMERGENCY STAIRCASE | PUT DOWN |
| BEWARE OF STEPS | BEWARE OF STEPS |
| BEWARE OF YOUR STEPS | STAIRWAY |
| USE ELEVETOR ON PACKAGE | BEWARE OF STEPS |
| BEWARE OF STAIRWAY | FALLING THINGS |
| STEEP STAIRWAY | DO NOT FALL THINGS |
| BEWARE OF STEPS | LOAD WHEN YOU DESCEND |
| BE HURTED | BEWARE OF STEPS |
| BEWARE OF STEPS | GO DOWN FOR DISPOSE |

## Appendix 35

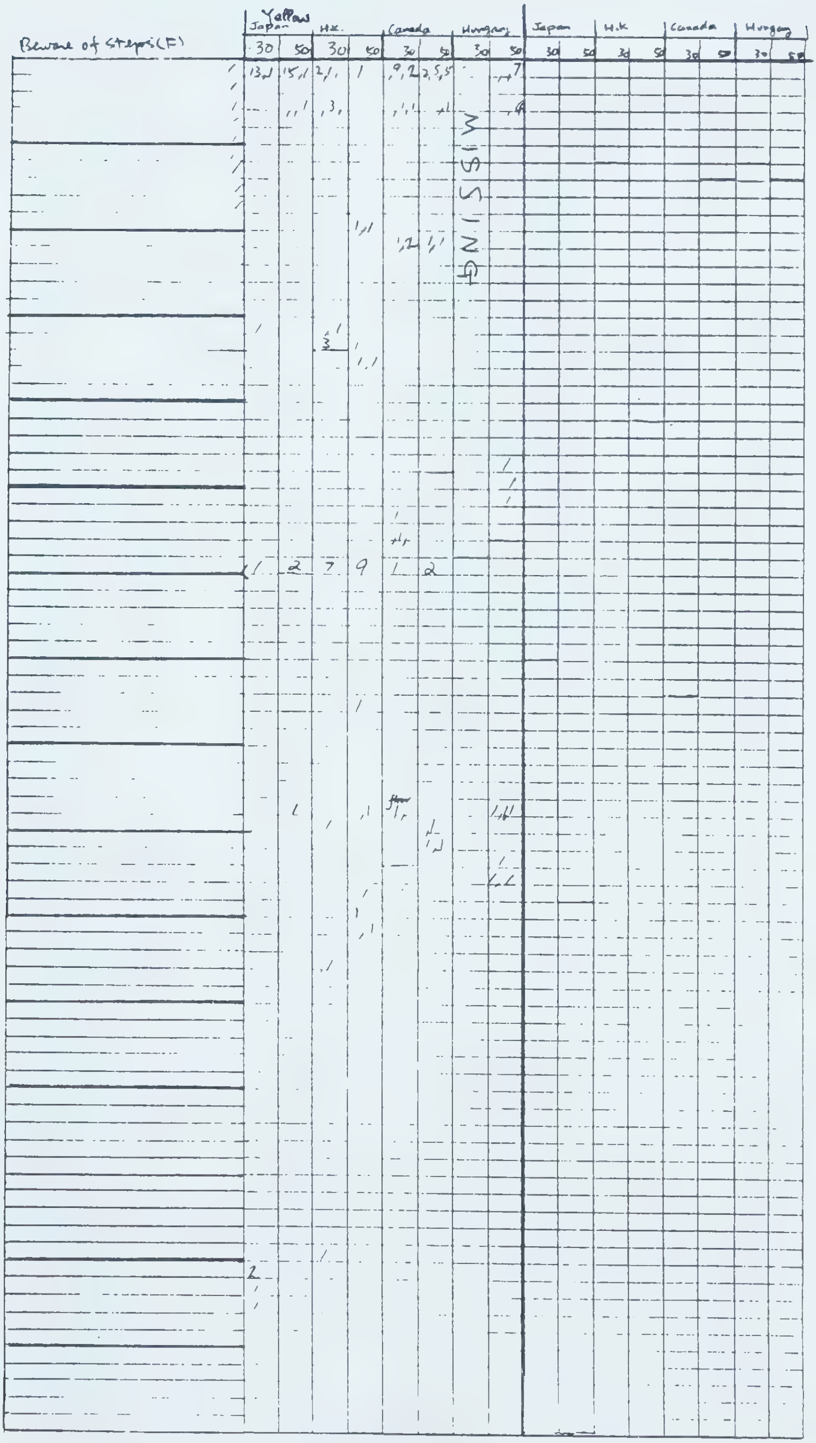
## Master sheet showing responses of the two age groups from four countries for the referent Beware of Steps



(The example has been reduced for this thesis.)

Appendix 36

## Master sheet showing responses of the two age groups from four countries for the referent Beware of Steps


Beware of Steps (F)
Yellow
Japan
H.K.
Canada
Hungary
30
50
Japan
H.K.
Canada
Hungary
MISSING

(The example has been reduced for this thesis.)

## Appendix 37

## Responses from four countries for categorization of responses related to the referent Beware of Steps

3EWARE OF STEPS (F)

beware of steps
beware of your steps
mind the steps
beware of steep stairways
'' '' stairway
steep stair
careful on stairs
steps
beware of staircase(stairs)
" " " when holding things
beware of accidents
stairs ahead
warning stair ahead
becareful when carrying load
" " walking
downstair
stairdown
walk carefully
becareful when going up & down the stairs
beware step up
beware up
going downstair
beware of cables
beware of electric wire
" " bump
" " the railing fence
" " iron/hardware
becareful when crossing the bridge
stairs to lower level
the person is walking
use zebra crossing
side walk/road damage
steps to be expected
trip hazard
caution low step
caution
dangerous stairs
beware
dangerous
becareful because stairs had no handle
do'nt know
beware of falling object
falling object
beware of falling parcel
beware of falling
beware of fallen down
" " convzing of goods
becareful of handling of chemicals
fallen down when moving box due to a false step
stair must have handles
watch step on stairs
becareful when crossing the road
ambiguous symbol
missing
handle with care
slipper stairs
" steps
abrupt stairs
uneven/surface
becareful uneven surface
rise of level
go downstair
down to lower floor
down
~~down~~ look down
high doorstep
look out along the sidewalk
look out surb
stony steps
must wear gloves
be hurted
remind people to write
use elevator on package
working area
restricted area

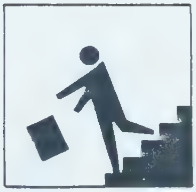
do'nt enter cliff
" throw garbage into the river
" carry objects down these stairs
no carrying down stairs
Dont walk too fast
do'nt carry heavy stuff while walking down
" fall things
no throwing things from above
do'nt leave objects
" " hands
Put down
go down for dispose
falling things
falling garbage
picking up things
becareful when picking up things
intend to pick thing
remind people to pick the box
throw here.
falling down stairs
falling off the stairs
winding road
take care not to cut off your finger
tapestry
please push
suspension of death penalty
basement
basement ahead
load when you descend
emergency staircase
garbage disposal prohibited
littering is not allowed
narrow stairway
chaing for falling object
walk carefully
Dont Know
missing

(The example has been reduced for this thesis.)

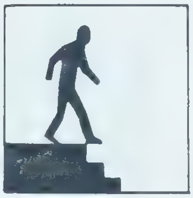
## Appendix 38
## Comprehension Recognition Test Results

Referent: Beware of Steps
Function: To indicate the presence of steps
Application: Occupational environments, Public places

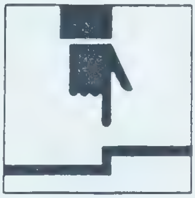
Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50



WCB
Variant Pink



SaSo
Variant Blue



Aureli
Variant Yellow

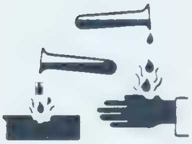
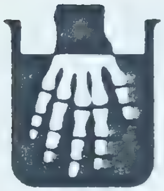
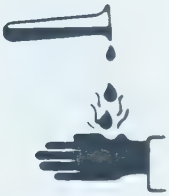
| Sample Size | 160 | 160 | 140 |
|---|---|---|---|
| Category | % | % | % |
| Certain | 32.1 | 72.9 | 52.6 |
| Likely | 5.6 | 7.1 | 5.3 |
| Marginally likely | 22.1 | 10.4 | 6.4 |
| Opposite meaning | 0.0 | 0.0 | 1.2 |
| Wrong | 27.1 | 5.2 | 18.8 |
| Don't know | 12.9 | 4.4 | 15.7 |
| Missing | 0.2 | 0.0 | 0.0 |

Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

## Appendix 39
## Comprehension Recognition Test Results

Referent: Corrosive
Function: To indicate the risk of contact with corrosive substances
Application: Occupational environments, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50

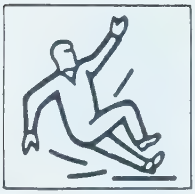
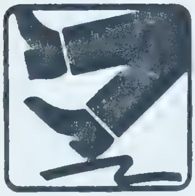
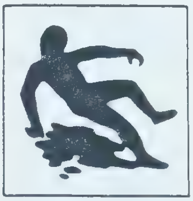
| | SIS'67 Variant Pink | SS Variant Blue | SIS'67 Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 40.7 | 34.2 | 39.5 |
| Likely | 15.4 | 14.2 | 11.6 |
| Marginally likely | 20.6 | 21.4 | 17.2 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 15.0 | 25.2 | 19.5 |
| Don't know | 7.7 | 5.0 | 12.2 |
| Missing | 0.6 | 0.0 | 0.0 |

Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

## Appendix 40
## Comprehension Recognition Test Results

Referent: Slippery Floors
Function: To indicate the presence of slippery floor conditions
Note: this symbol is intended for temporary use only and shall only be displayed while the slippery condition exists
Application: Occupational environments, Public places

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50

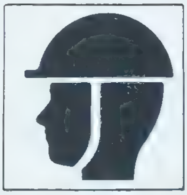
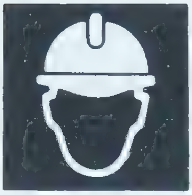
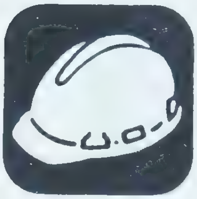
| | Dreyfuss<br>Variant Pink | FMC<br>Variant Blue | BS'82<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 61.7 | 59.4 | 59.8 |
| Likely | 16.7 | 15.8 | 17.6 |
| Marginally likely | 7.5 | 4.2 | 5.0 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 11.0 | 15.0 | 14.0 |
| Don't know | 1.3 | 5.6 | 3.6 |
| Missing | 1.8 | 0.0 | 0.0 |

Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

## Appendix 41
## Comprehension Recognition Test Results

Referent: Hard Hat Required
Function: To indicate an area where the wearing of head protection is mandatory
Application: Occupational environments, Pieces of equipment

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50

| |  TFSP<br>Variant Pink |  SS<br>Variant Blue |  Willson<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 63.3 | 61.3 | 64.3 |
| Likely | 9.6 | 7.9 | 8.1 |
| Marginally likely | 9.4 | 7.5 | 13.3 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 11.5 | 19.6 | 7.9 |
| Don't know | 5.6 | 3.7 | 5.0 |
| Missing | 0.6 | 0.0 | 1.4 |

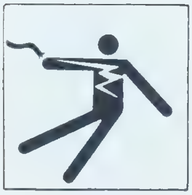
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

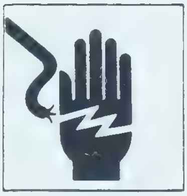
Appendix 42

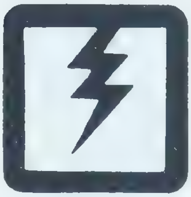
## Comprehension Recognition Test Results

Referent: High Voltage
Function: To indicate the presence of electric current which may be a definite hazard
Application: Occupational environments, Public places, Pieces of equipment

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50


FMC
Variant Pink


FMC
Variant Blue


KPIE'81
Variant Yellow

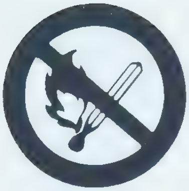
| | FMC<br>Variant Pink | FMC<br>Variant Blue | KPIE'81<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 64.4 | 54.4 | 31.2 |
| Likely | 7.5 | 11.0 | 4.5 |
| Marginally likely | 9.4 | 11.5 | 6.2 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 14.4 | 15.0 | 41.7 |
| Don't know | 4.3 | 8.1 | 16.4 |
| Missing | 0.0 | 0.0 | 0.0 |

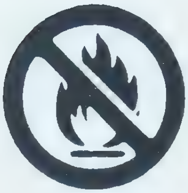
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

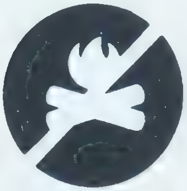
## Appendix 43
## Comprehension Recognition Test Results

Referent: No Open Flame
Function: To indicate fire, naked flame and smoking prohibited
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







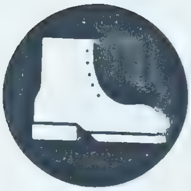
| | ISO'84<br>Variant Pink | SS<br>Variant Blue | CNSS<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 57.7 | 60.0 | 44.3 |
| Likely | 15.6 | 15.0 | 14.0 |
| Marginally likely | 11.3 | 13.3 | 16.4 |
| Opposite meaning | 0.8 | 1.3 | 1.7 |
| Wrong | 9.6 | 7.9 | 15.7 |
| Don't know | 4.4 | 2.5 | 7.9 |
| Missing | 0.6 | 0.0 | 0.0 |

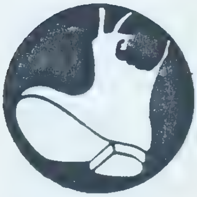
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

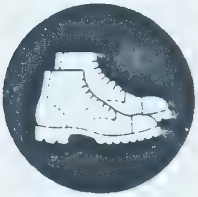
## Appendix 44
## **Comprehension Recognition Test Results**

Referent: Foot Protection Required
Function: To indicate an area where the wearing of foot protection is mandatory
Application: Occupational environments

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







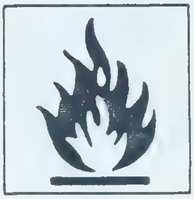
| | Un<br>Variant Pink | USDC<br>Variant Blue | SABS'78<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 42.7 | 48.3 | 41.4 |
| Likely | 6.0 | 10.2 | 7.4 |
| Marginally likely | 13.1 | 10.0 | 11.7 |
| Opposite meaning | 3.8 | 1.7 | 4.8 |
| Wrong | 18.8 | 16.7 | 20.4 |
| Don't know | 15.0 | 12.5 | 14.3 |
| Missing | 0.6 | 0.6 | 0.0 |

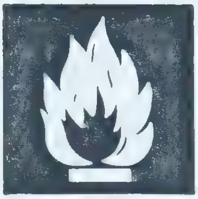
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

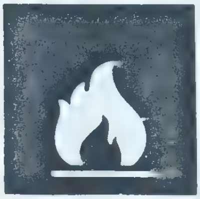
## Appendix 45
## Comprehension Recognition Test Results

Referent: Flammable
Function: To indicate the presence of a flammable substance
Application: Occupational environments, Public places, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







| | SaSo<br>Variant Pink | MSA<br>Variant Blue | LSL<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 35.2 | 28.5 | 23.6 |
| Likely | 7.5 | 8.8 | 6.7 |
| Marginally likely | 16.9 | 21.3 | 19.3 |
| Opposite meaning | 6.5 | 10.2 | 11.7 |
| Wrong | 28.3 | 23.1 | 25.2 |
| Don't know | 5.0 | 8.1 | 13.5 |
| Missing | 0.6 | 0.0 | 0.0 |

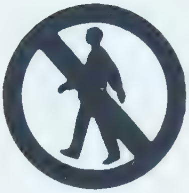
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

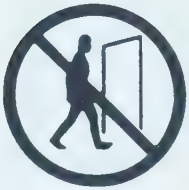
Appendix 46

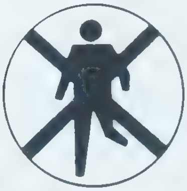
## Comprehension Recognition Test Results

Referent: No Trespassing
Function: To indicate an area of restricted access
Application: Occupational environments, Public places

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







| | SaSo<br>Variant Pink | NM<br>Variant Blue | WCB<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 33.3 | 75.2 | 37.2 |
| Likely | 12.9 | 1.5 | 9.3 |
| Marginally likely | 12.3 | 0.4 | 6.0 |
| Opposite meaning | 0.4 | 0.2 | 0.2 |
| Wrong | 36.1 | 12.7 | 40.2 |
| Don't know | 4.4 | 10.0 | 7.1 |
| Missing | 0.6 | 0.0 | 0.0 |

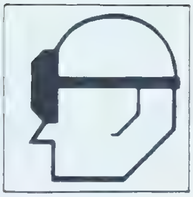
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

Appendix 47

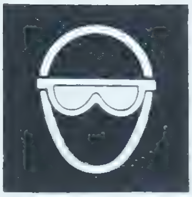
## Comprehension Recognition Test Results

Referent: Eye Protection Required
Function: To indicate an area where the wearing of eye protection is mandatory
Application: Occupational environments, Pieces of equipment

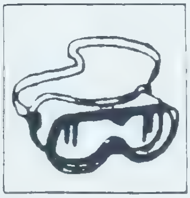
Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50



NM
Variant Pink



CSAO'84
Variant Blue



SEMEX
Variant Yellow

| Sample Size | 160 | 160 | 140 |
|---|---|---|---|
| Category | % | % | % |
| Certain | 48.3 | 53.3 | 50.7 |
| Likely | 7.5 | 10.6 | 7.8 |
| Marginally likely | 9.2 | 8.6 | 8.8 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 26.3 | 18.1 | 12.0 |
| Don't know | 7.5 | 9.4 | 29.7 |
| Missing | 1.2 | 0.0 | 0.0 |

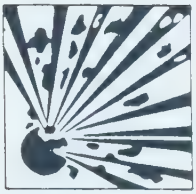
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

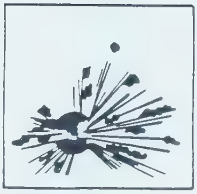
Appendix 48

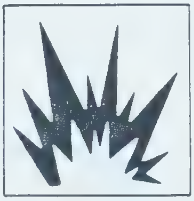
## Comprehension Recognition Test Results

Referent: Explosive
Function: To indicate the risk of explosion
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







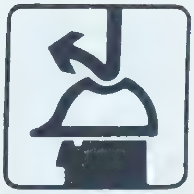
| | Un<br>Variant Pink | SIS'67<br>Variant Blue | FMC<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 52.5 | 60.0 | 58.4 |
| Likely | 4.2 | 2.8 | 4.5 |
| Marginally likely | 8.1 | 5.4 | 10.2 |
| Opposite meaning | 0.0 | 0.6 | 0.0 |
| Wrong | 20.8 | 18.1 | 15.5 |
| Don't know | 13.8 | 13.1 | 11.4 |
| Missing | 0.6 | 0.0 | 0.0 |

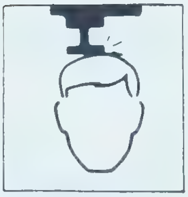
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

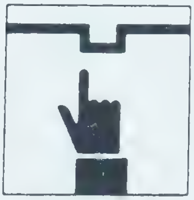
Appendix 49
## Comprehension Recognition Test Results

Referent: Overhead Hazard
Function: To indicate the risk of overhead hazard in designated areas
Application: Occupational environments

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50


FMC
Variant Pink


BS'82
Variant Blue


Aureli
Variant Yellow

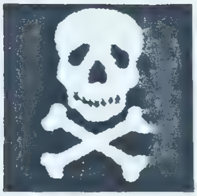
| | | | |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 28.8 | 40.6 | 20.5 |
| Likely | 37.7 | 26.5 | 15.5 |
| Marginally likely | 17.7 | 13.0 | 9.3 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 8.3 | 10.6 | 27.6 |
| Don't know | 6.9 | 9.3 | 27.1 |
| Missing | 0.6 | 0.0 | 0.0 |

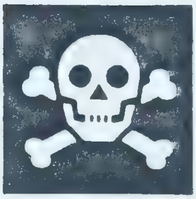
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

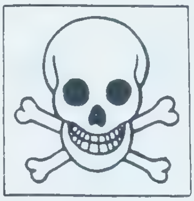
## Appendix 50
## **Comprehension Recognition Test Results**

Referent: Poison
Function: To indicate the presence of a poisonous substance
Application: Occupational environments, Public places, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







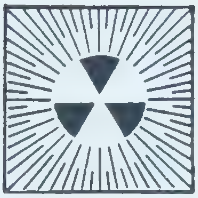
| | LSS<br>Variant Pink | Brady'84<br>Variant Blue | Un<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 50.8 | 43.5 | 44.3 |
| Likely | 7.5 | 8.8 | 11.9 |
| Marginally likely | 12.9 | 16.7 | 17.4 |
| Opposite meaning | 0.0 | 0.4 | 0.0 |
| Wrong | 24.4 | 21.2 | 20.7 |
| Don't know | 3.8 | 9.4 | 5.7 |
| Missing | 0.6 | 0.0 | 0.0 |

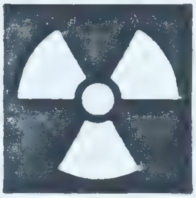
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

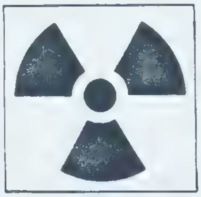
## Appendix 51
## Comprehension Recognition Test Results

Referent: Radiation
Function: To indicate the actual or potential presence of ionizing radiation and to identify objects, devices, materials or combinations of materials which emit ionizing radiation
Application: Occupational environments, Public places, Pieces of equipment, Vehicles, Containers of products, Catalogues and other publications

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







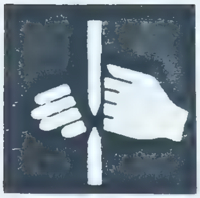
| | ERCO<br>Variant Pink | Un<br>Variant Blue | FFA<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 43.1 | 25.8 | 27.9 |
| Likely | 0.6 | 0.6 | 0.7 |
| Marginally likely | 0.8 | 1.3 | 2.6 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 26.1 | 52.9 | 38.1 |
| Don't know | 28.8 | 19.4 | 30.7 |
| Missing | 0.6 | 0.0 | 0.0 |

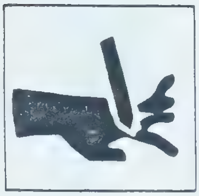
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

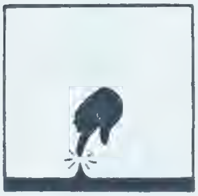
## Appendix 52
## Comprehension Recognition Test Results

Referent: Sharp Edge
Function: To indicate the risk implied by sharp objects or cutting edges or blades
Application: Occupational environments, Pieces of equipment

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







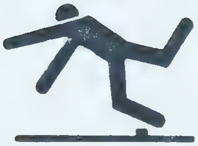
| | KT<br>Variant Pink | FMC<br>Variant Blue | Adkins<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 47.7 | 28.1 | 16.2 |
| Likely | 13.8 | 11.1 | 3.6 |
| Marginally likely | 15.6 | 17.5 | 12.1 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 12.3 | 21.4 | 43.1 |
| Don't know | 10.0 | 21.9 | 25.0 |
| Missing | 0.6 | 0.0 | 0.0 |

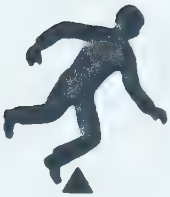
Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of Visual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

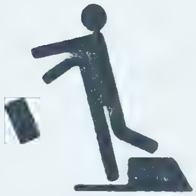
## Appendix 53
## Comprehension Recognition Test Results

Referent: Trip Hazard
Function: To indicate the risk of tripping in designated areas
Application: Occupational environments, Public places, Vehicles (railway car, ferry boat, boarding ramp, etc.)

Country: Canada, Hong Kong, Hungary and Japan
Age Range: Under 30 and Over 50







| | Stone<br>Variant Pink | BS'82<br>Variant Blue | Dreyfuss<br>Variant Yellow |
|---|---|---|---|
| Sample Size | 160 | 160 | 140 |
| Category | % | % | % |
| Certain | 30.2 | 40.4 | 7.4 |
| Likely | 33.8 | 24.2 | 23.3 |
| Marginally likely | 17.3 | 15.2 | 10.7 |
| Opposite meaning | 0.0 | 0.0 | 0.0 |
| Wrong | 10.6 | 10.8 | 39.3 |
| Don't know | 7.5 | 9.4 | 19.3 |
| Missing | 0.6 | 0.0 | 0.0 |

Consensus Judge Qualification
Judge 1: Prof. Jorge Frascara, Chairman of Department of Art and Design
Judge 2: Prof. Walter Jungkind, Co-ordinator of DVisual Communication Design
Judge 3: Mr. Tony Yau, Graduate Student of Department of Art and Design

## Introduction to Appendices 54 to 65

Based on the research data, verbal descriptions of the image content are proposed. The visual design of the guideline examples has been developed with a view to keeping consistency with already published ISO standards and following recommendations published in ISO TR 7239.

Appendix 54

## Draft Standard

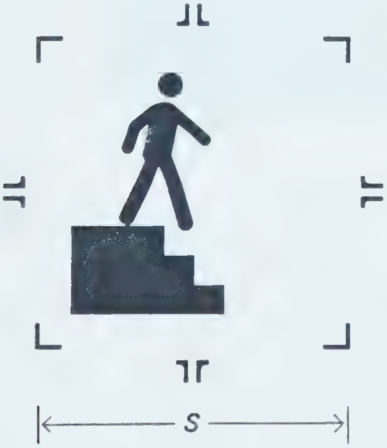
### 1 Draft Standard[1]

| |
|---|
| Safety symbol:<br>Beware of steps |
| Standard image content:<br>Side view of a human figure on top of profile of stairs with three steps, walking with forward leg stepping into void of stairwell |
| Function:<br>To indicate the presence of steps |
| Field(s) of application:<br>Occupational environments, Public places |

### 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit

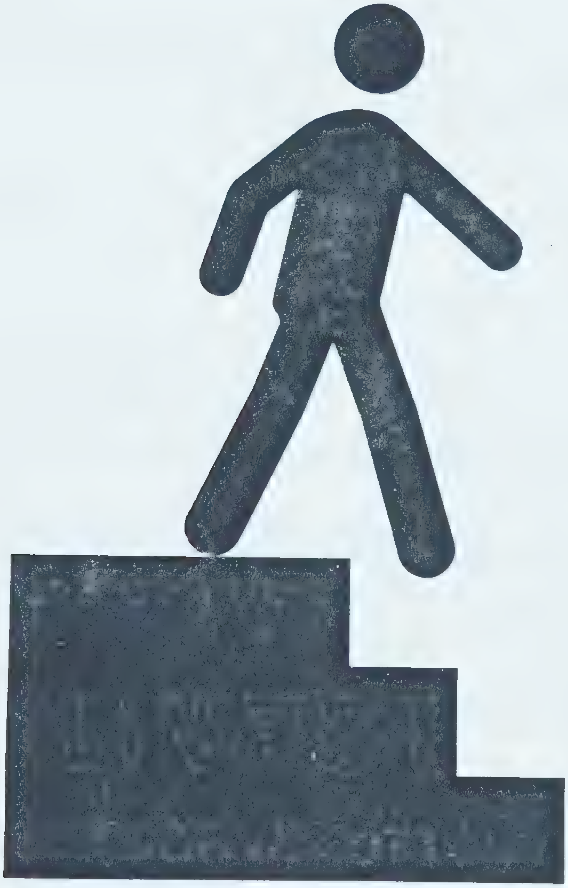


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

## Appendix 55

## Large-scale example of Beware of Steps



Appendix 56
**Draft Standard**

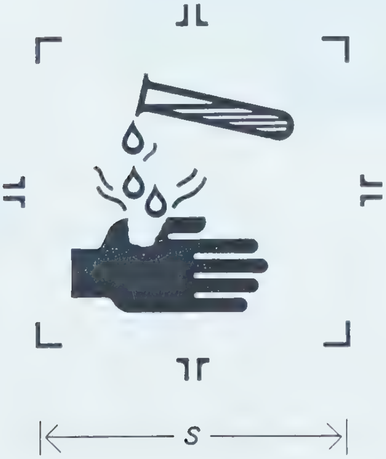
## 1 Draft Standard[1]

| |
|---|
| Safety symbol:<br>Corrosive |
| Standard image content:<br>Side view of glass lab tube dropping liquid on hand, with visible disintegration of thumb and palm |
| Function:<br>To indicate the risk of contact with corrosive substances |
| Field(s) of application:<br>Occupational environments,<br>Pieces of equipment, Vehicles, Containers of products,<br>Catalogues and other publications |

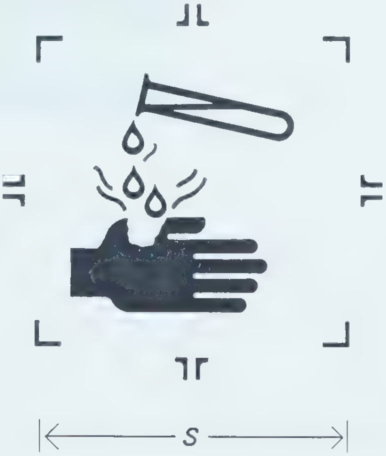
## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit



**Guide-line example, simplified for small-scale reproduction** ($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 8$ mm
Maximum: $s = 12$ mm

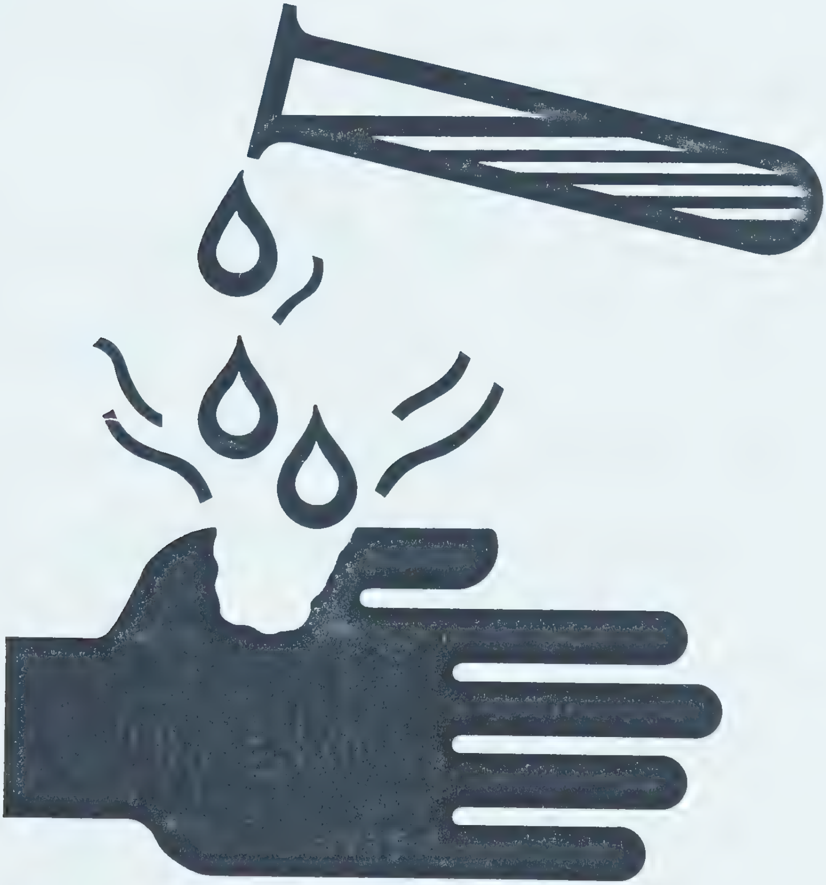


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

Appendix 57

**Large-scale example of Corrosive**



Appendix 58

**Draft Standard**

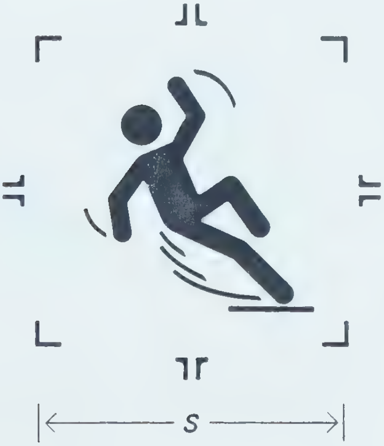
## 1 Draft Standard[1]

| |
|---|
| Safety symbol:<br>Slippery floor |
| Standard image content:<br>Horizontal line, with a human figure that has lost its balance, including short lines indicating motion |
| Function:<br>To indicate the presence of slippery floor conditions<br>Note: this symbol is intended for temporary use only and shall only be displayed while the slippery condition exists |
| Field(s) of application:<br>Occupational environments, Public places |

## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit

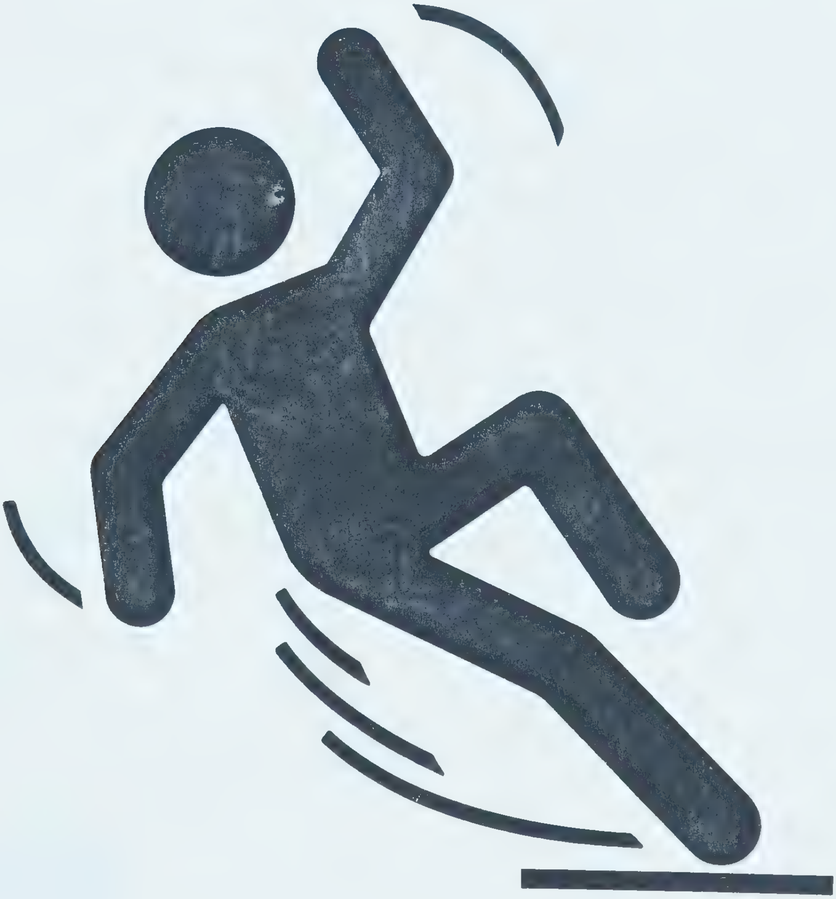


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

Appendix 59

**Large-scale example of Slippery Floor**



Appendix 60

**Draft Standard**

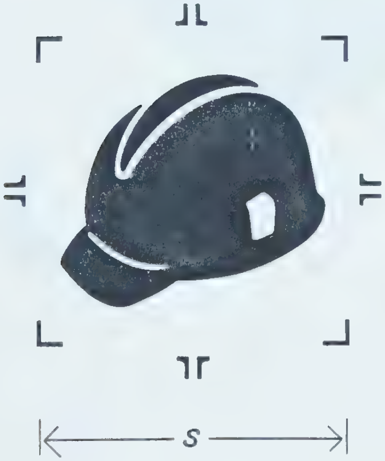
## 1 Draft Standard[1]

| |
|---|
| Safety symbol:<br>Hard hat required |
| Standard image content:<br>Perspective view of hard hat seen from top right |
| Function:<br>To indicate an area where the wearing of head protection is mandatory |
| Field(s) of application:<br>Occupational environments,<br>Pieces of equipment |

## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit

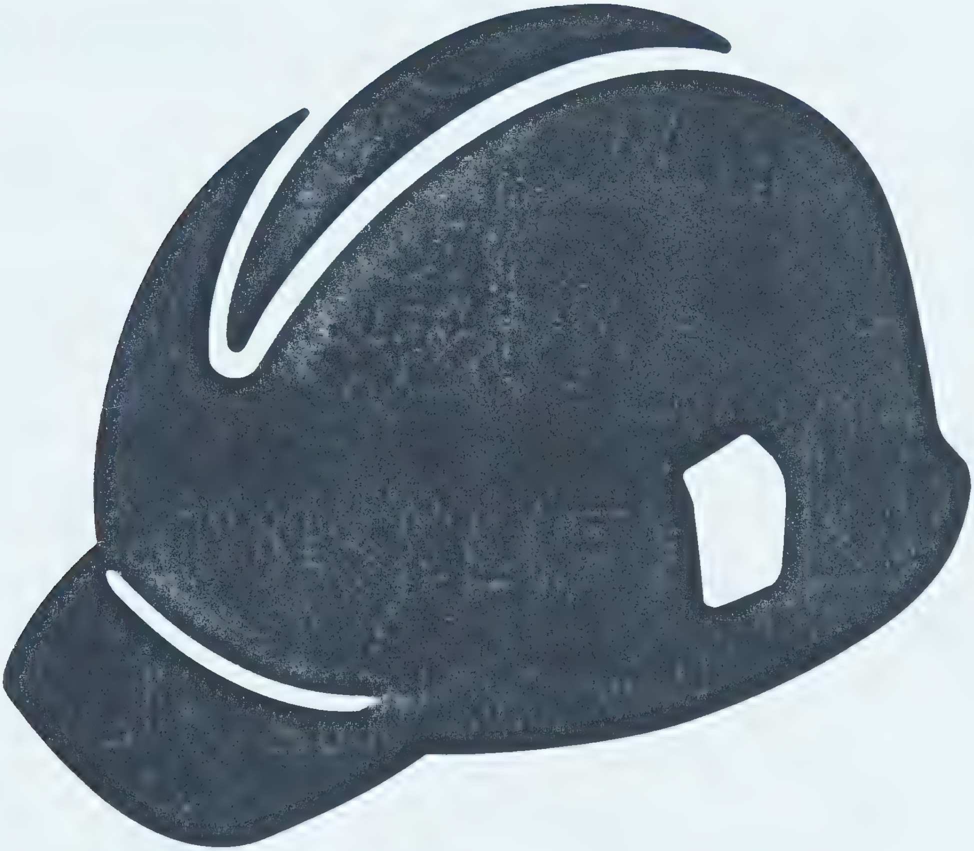


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

## Appendix 61

## **Large-scale example of Hard Hat Required**



Appendix 62
**Draft Standard**

## 1 Draft Standard[1]

Safety symbol:
High voltage

Standard image content:
Wire contacting front view of falling human figure including white zigzag line inside of body

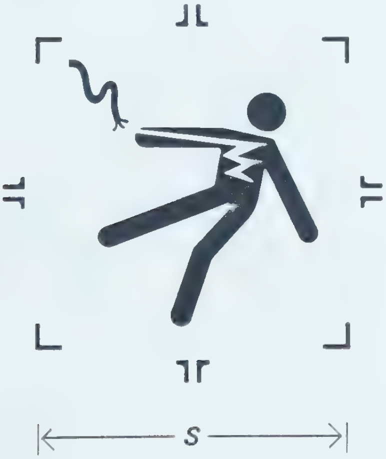
Function:
To indicate the presence of electric current which may be a definite hazard

Field(s) of application:
Occupational environments, Public places
Pieces of equipment

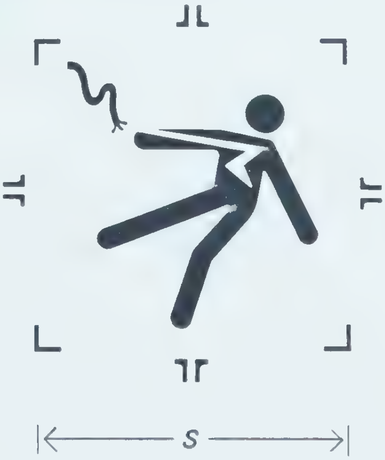
## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit



**Guide-line example, simplified for small-scale reproduction** ($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 8$ mm
Maximum: $s = 12$ mm

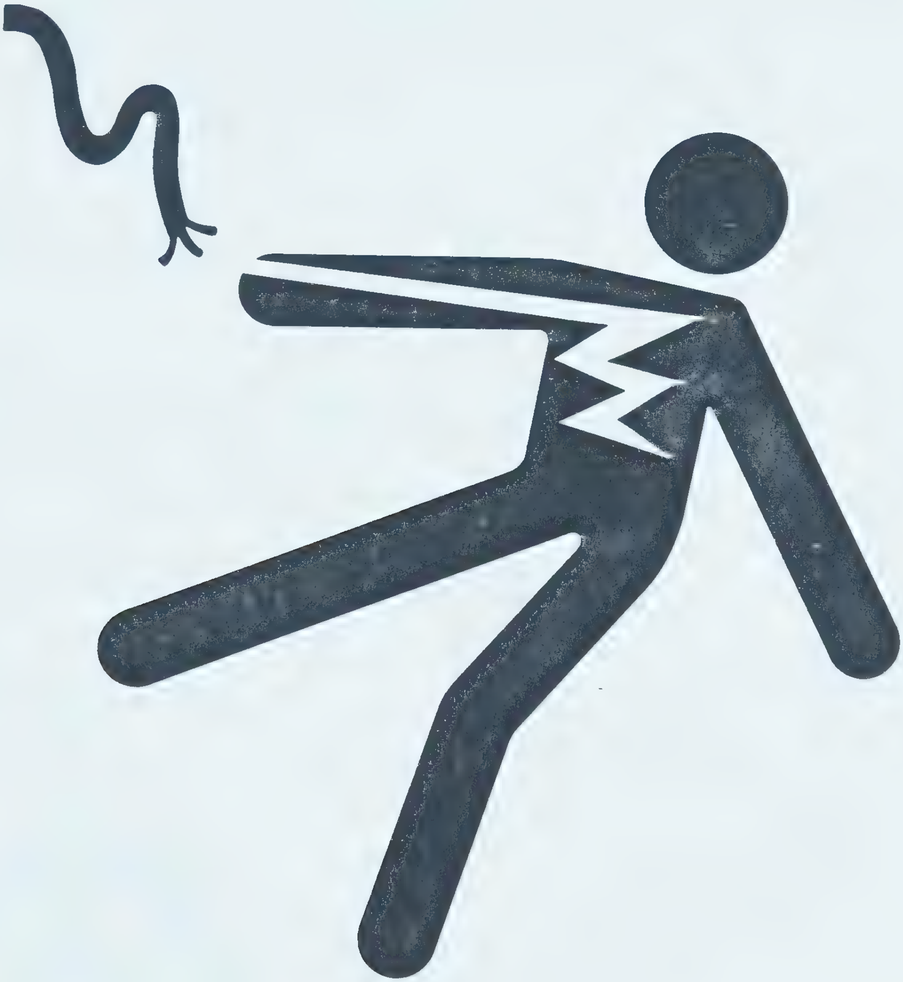


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

Appendix 63

**Large-scale example of High Voltage**



Appendix 64

## Draft Standard

### 1 Draft Standard[1]

Safety symbol:
No open flame

Standard image content:
Slash bar over flame rising from horizontal line

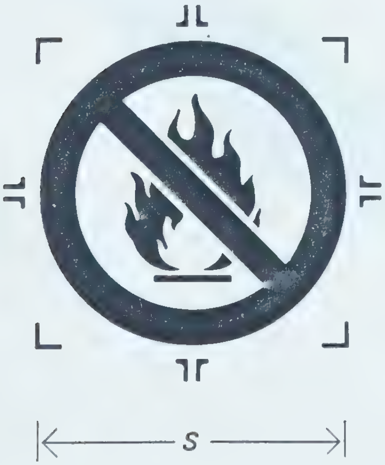
Function:
To indicate fire, naked flame and smoking prohibited

Field(s) of application:
Occupational environments, Public places
Pieces of equipment, Vehicles, Containers of products,
Catalogues and other publications

### 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
($s = 45$ mm)
Size limits for the design below:
Minimum: $s = 12$ mm
Maximum: no limit

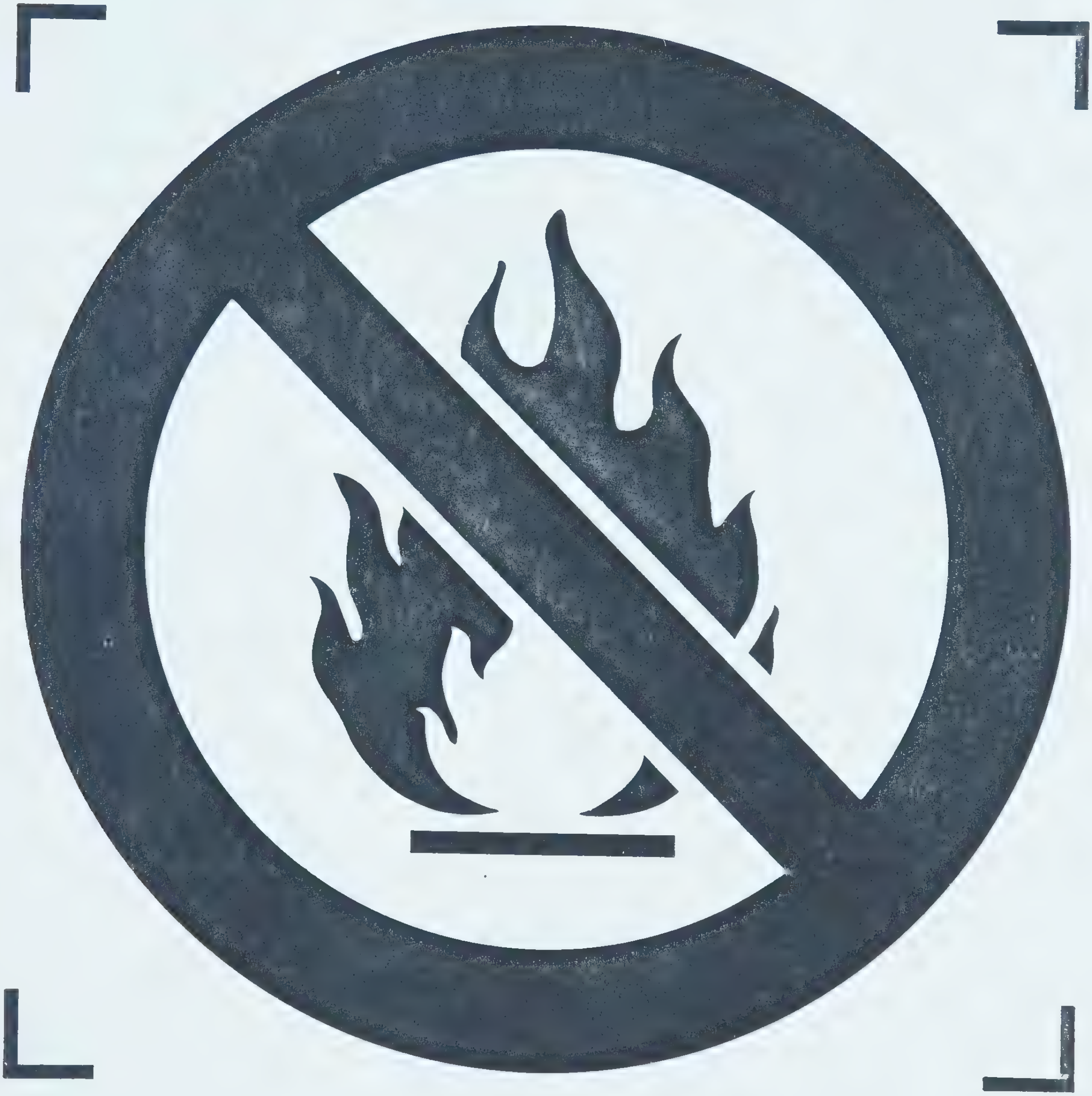


---

[1] This sheet should be used in conjunction with ISO 7001 and ISO/TR 7239.

Appendix 65

## Large-scale example of No Open Flame



## List of slides

Slide description Slide no.

Introduction .......................................... 1
Compilation of Existing Materials ........................ 2
Compilation of Existing Materials ........................ 3
Appropriateness Ranking Test ............................. 4
Presentation of Results and Selection of Symbols ......... 5
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Draft Proposal: Beware of Steps .......................... 9
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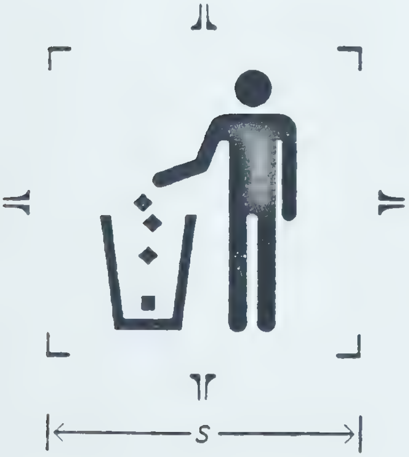
## 1 Standard[1]

| | |
|---|---|
| Public information symbol: | Dispose |
| Standard image content: | Standing figure adjacent to sectional elevation of a rubbish receptacle<br>Four representative articles of rubbish falling into the receptacle |
| Function: | To indicate where waste material may be thrown away |
| Field(s) of application: | Public places, buildings, services, maps and guides, orientational diagrams, vehicles. |

## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged.

**Guide-line example:**
(s = 45 mm)



---

[1] This sheet should be used in conjunction with the "Introduction" and ISO/TR 7239

Final Visual Presentation
for the Degree of
Master of Visual Arts

# Evaluation and Development of Safety Symbols

## Survey of Existing Graphic Symbols for Safety

Visual Communication Design

Tony Yau
1986

Final Visual Presentation
for the Degree of
Master of Visual Arts

# Evaluation and Development of Safety Symbols

Visual Communication Design

Tony Yau
1986

Master of Visual Arts Thesis
Part I

# Survey of Existing Graphic Symbols for Safety

Tony Yau
Thesis Supervisor: Prof. Jorge Frascara

Visual Communication Design
Department of Art and Design
University of Alberta
Edmonton, Canada
1986

## Introduction

The compilation of this resource book on safety symbols was made through library research, correspondence and personal contacts. Various government agencies, organizations, sign manufacturers and researchers involved directly or indirectly in health and safety in the working environment were consulted.

148 letters were sent to 47 countries around the world. 60 safety related referents (more than 1400 symbols) were collected and categorized into five categories. They are related to Hazards (warning), Protection, Fire Safety, Prohibition and Information.

Information and notes about the sources of symbols are provided for reference. Each individual symbol is identified by a code which should be interpreted as follows:

| Code | Indicates |
|---|---|
| AS | Originator: Australian Standard |
| 1983 | Published: 1983 |

# Index

**Abbreviations and notes about the sources of symbols** A1

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## Abbreviations and notes about the sources of symbols

In addition to the original sources gathered from personal contacts and correspondences, four major secondary sources were included in this booklet. They are as follows:

American Institute of Graphics Arts
Symbol Signs, 1981

Dreyfuss, H.
Symbol Sourcebook, 1984

Easterby, R. and Graydon, I.
Evaluation of Public Information Symbols, ISO Tests: 1979/80 Series, Part I: Appropriateness Ranking Tests, AP Report 99, 1981

Modley, R.
Handbook of Pictorial Symbols, 1976

Sources of symbols derived from the secondary materials are preceded by one of the codes – AIGA, Dreyfuss, Eas, Mod – before the code of the original source.

**Adkins**
Jan Adkins, *Symbols: Silent Language,* Walker and Company, New York, 1978.

**Anikst**
Design: Michail Anikst, USSR. *Graphic Design* No. 88, December 1982.

**Aureli**
Design: Bert Aureli, Reading, England. *Form and Communication,* ABC Editions Zurich, 1974.

**AC**
Adachi Clinic, Japan. Design: Hara Choei, Honma Yozo and Ohira Kayoko. *Graphic Design* No. 64, December 1976.

**ACG**
Appendix to the *Canada Gazette,* Part I, Department of Transportation, Canada, June 1982.

**ADI**
Aluminum Dufresne Inc., Quebec, Canada.

**AIGA, AIGA/**
American Institute of Graphic Arts, *Symbol Signs*, 1981.

**AS**
Australian Standard 1983, *Safety Signs for the Occupational Environment.*

**ATL**
Alberta Traffic Ltd., Canada.

**Best**
Best Sign Systems, Best Manufacturing Co., Colorado, U.S.A., *Catalogue No. 683.*

**Brady**
W.H. Brady Company of Canada Ltd., Signmark Division, Ontario, Canada, *Catalog No. C321, 1978 and S-6, 1984.*

**BAMH**
Buenos Aires Municipal Hospitals. Design: Shakespear Brothers. *Graphic Design* No. 83, September 1981.

**BS**
British Standard, *BS 5378: Part I: 1980, BS 5378: Part 3: 1982.*

**BTLC**
B.T. Label Centre, U.K.

**Collins**
Belinda Lowenhaupt Collins, *The Development and Evaluation of Effective Symbol Signs,* NBS Building Science Series 141, U.S. Department of Commerce, National Bureau of Standards, 1982.

**CESSS**
"Communication Effectiveness of Symbolic Safety Signs with Different User Groups" by P. Cairney and D. Sless, *Applied Ergonomics*, June 1982.

## Abbreviations and notes about the sources of symbols

**CNSS**
"Canada's National Signing System: A Bilingual Solution", *Print* No. 30, May 1976.

**CRCS**
The Canadian Red Cross Society, *Be An Instructor*, Alberta/N.W.T. Division.

**CSAO**
Construction Safety Association of Ontario, 1984.

**Dreyfuss**
Henry Dreyfuss, *Symbol Sourcebook*, Van Nostrand Reinhold Company, New York, 1984.

**DS**
Danish Standard, *DS 734.2*, 1981.

**DSC**
Direct Safety Company, Phoenix, Arizona, U.S.A., *1985-N Catalog*.

**DSM**
Dutch State Mines, The Netherlands, 1969. Design: Pieter Brattinga. *Graphic Design* No. 39, September 1970.

**DSR**
Danish State Railways. Design: Industrial Designers Denmark (IDD). *Graphic Design* No. 95, September 1984.

**Eas/**
R.S. Easterby and I.R. Graydon, *Evaluation of Public Information Symbols, ISO Tests: 1979/80 Series, Part 1: Appropriateness Ranking Tests, AP Report 99*, University of Aston in Birmingham, 1981.

**EES**
Emergency Exit Sign, Japan. *Graphic Design* No. 88, December 1982.

**ERCO**
ERCO pictograms, ERCO Leuchten GmbH of West Germany. Design: Otl Aicher and Martin Krampen. *Graphic Design* No. 65, March 1977.

**ESSP**
"Effective Safety Signs and Posters" by Edward D. Dionne, *National Safety News*, October 1979.

**EUSAO**
Electrical Utilities Safety Association of Ontario, Inc., Canada.

**EXPO '75**
Expo '75, Okinowa, Japan. Design: Asada Takashi and Katzumie Masaru. *Graphic Design* No. 61, March 1976.

**Focal**
Focal Displays Ltd., Surrey, 1984.

**FFA**
Swedish Work Environment Association (Föreningen för Arbetarskydd), Sweden.

**FIP**
Federal Identity Program, *Design Guide*, Treasury Board Canada, 1980 and 1983.

**FMC**
FMC Corporation, Santa Clara, California, U.S.A. 1980.

**FZR**
Evelyn Ferman, Maria Del Carmen Zilio and Rafael Rodrigues, *Graphic Design* No. 60, December 1975.

**Glyphs**
Glyphs #6, *Graphic Design* No. 43, September 1971.

**Grange**
Design: Jacobus Le Grange, Manchester College of Art and Design. ICOGRADA student project, *Design* No. 214, October 1966.

**Gyllan**
Peter Gyllan, *Novum* No. 2, 1984.

**HH**
The Hague Hospital, Westeinde Ziekenhuis. Design: Studio Dumbar, The Netherlands. *Graphic Design* No. 83, September 1981.

**HIFPS**
Handbook of Industrial Fire Protection and Security, England.

## Abbreviations and notes about the sources of symbols

**HISH**
Handbook of Industrial Safety and Health, England, 1980.

**HL**
Hi-Lite Signs Limited, England.

**HS**
Helsinki Subway. Design: Ola Laiho, Esko Miettinen, Juani Palasmaa and Esa Piironen. *Novum*, July 1978.

**HSR**
Hazardous Substances Regulations, *Hazardous Products Act*, Environmental Health Centre, Ontario, Canada.

**IATA**
IATA restricted articles regulations, Canada, 1969.

**IDGS**
*International Dictionary of Graphic Symbols* by John Stinstein, Kogan Page Ltd., London, 1983.

**ISO**
**1984**
International Organization for Standardization, *Safety Colours and Safety Signs, Ref. No. ISO 3864-1984(E) and ISO 7001/DADI*, Switzerland.

**ISSC**
Industrial Safety and Security Co., *Industrial Safety Products Catalogue,* Ohio, U.S.A., 1985.

**IVDS**
Industrial Visual Design Studio of Aloisio Magalhaes, Rio de Janeiro, Brazil, 1972-74. *Graphic Design* No. 60, December 1975.

**JJ**
Johnson and Johnson, Inc., *First Aid Guide*, Toronto.

**Kapitzki**
Design: Herbert W. Kapitzki, Institute for Visual Communication, Berlin, Germany. *Form and Communication,* ABC Editions Zurich, 1974.

**KPIE**
Kobe Port Island Exposition, Japan. *Graphic Design* No. 82, June 1981.

**KT**
Design: J. Kibblewhite and M. Twyman, United Kingdom. *Graphic Design* No. 83, September 1981.

**Letraset**
Letraset Product Manual, Letraset Canada Ltd., 1983.

**Lom**
Lombardy City Transportation. Design: Ricardo Nava, Giorgio Roman, Ducio Soffientini and Alessandro Ubertazzi, Milan. *Novum* No. 1, 1984.

**LCII**
Labour Canada II, Safety and Health Standards.

**LSL**
Levitt Safety Ltd., Ontario, Canada.

**LSS**
Lab Safety Supply, U.S.A., 1984.

**Mar**
Marzetta Signs Inc., California, *Catalogue No. 81*, 1984.

**Mobil**
Mobil. Design: Chermayeff and Geismar Associates. Glyphs #15, *Graphic Design* No.52, Winter 1973-74.

**Mod, Mod/**
Rudolf Modley and William Myers, *Handbook of Pictorial Symbols*, Dover Publications, Inc., New York, 1976.

**MIV**
"Making Israel Visible" by Aaron Marcus, *Print* V. 27, No. 5, September 1973.

**MSA**
Mine Safety Appliances Company of Canada Ltd.

**NBN**
Belgian Standards, *NBN X08-001*, 1983.

## Abbreviations and notes about the sources of symbols

**NEMA**
National Electrical Manufacturers Association, Draft, Washington, D.C., U.S.A., 1984.

**NFPA**
National Fire Prevention Association, *NFPA 1978-1980.*

**NM**
National Marker Company, Pawtucket, Rhode Island, U.S.A., *Catalogue No. 9*, 1984.

**NSDT**
Nova Scotia Department of Tourism. Design: Corporation ARC. Glyphs #15, *Graphic Design* No. 52, Winter 1978-74.

**O'76**
Montreal Olympics 1976. Design: George Huel, *Print* No. 30, May 1976.

**OD**
Design: R. Otreba, Poland, and Atelier W. Diethelm, Switzerland. *Signet, Signal, Symbol*, ABC Editions Zurich, 1970.

**ÖNORM**
Austrian Standard ÖNORM A3011, *Graphic Design* No. 91, September 1983.

**Pg**
Picto'grafics, Paul Arthur and Associates, Inc.

**Picto**
Picto System, Grafox, Brussels. Design: Anne-Judith van Loock and Luc Vanmalderen.

**Print**
*Print* V. 23, December 1969.

**PrS**
Prague Subway. Design: Jiri Rathousky. *Graphic Design* No. 62, June 1976.

**PPC**
Pittsburgh Poison Center. Glyphs #12, *Graphic Design* No. 49, March 1973.

**PS**
"Personal Safety" by R. Dace, D. Nursalim, R. Peterlongo and A. Uren, United Kingdom. *Graphic Design* No. 83, September 1981.

**PSS**
Permark Symbol Signs, Toronto Stamp Inc., *Catalogue SS-105.*

**PUP**
Prague Underground Pictograms. *Graphic Design* No. 58, June 1975.

**RAPS**
Requirements for Accident Prevention Signs, *National Safety News*, July 1970.

**REDR**
Radiation Emitting Devices Regulations, *Radiation Emitting Devices Act*, Chapter 34 (1st Supp.), Revised Statutes of Canada, 1970.

**RH**
Joaquim Redig and Osvaldo Hartenstin, *Graphic Design* No. 60, December 1975.

**Signcal**
Signcal, Toronto Stamp Inc., Canada, *Catalogue No. AS201*, 1983.

**Spect 70**
Spectralite 70 Ltd., Toronto.

**Stone**
Stonehouse Signs, Inc., Colorado, U.S.A., *Catalogue No. 20.*

**SaSo**
Sargent Sowell Inc., Grand Prairie, Texas, U.S.A., *Catalogue No. 177,* 185.

**SABS**
South African Bureau of Standards, *SABS No. 1186*, 1978.

**SBB**
Swiss Railroads, *Novum* No. 8, 1983.

**SCC**
Supplies Canada Company, Ontario, *Catalogue No. 34.*

## Abbreviations and notes about the sources of symbols

**SCU**
Swedish Cooperative Union, 1973. Design: Claes Tottie. Glyphs #20, *Graphic Design* No. 57, March 1975.

**SE**
Space Expo Signs, Tokyo, Japan 1978. *Graphic Design* No. 71, September 1978.

**SEMEX**
SEMEX, S.A., Puebla, Mexico.

**SIS**
Swedish Standards Institution, 03 12 10, 1967.

**SK**
Design: Jan Olov Sundström and Sunniva Kellquist, Konstfackskolan, Stockholm. ICOGRADA student project, *Design* No. 214, October 1966.

**SLL**
Signs and Labels Ltd., Cheshire, 1984.

**SS**
Signs of Safety, Inc., Portland, Maine, U.S.A.

**SSC**
Safety Supply Canada, *Safety Equipment Catalogue 1976 & 1984.*

**SSI**
Standard Signs, Inc., Ohio, U.S.A., *Catalogue No. 10.*

**SW**
"Substitutes for Words – International Graphic Symbols" by Mary E. Osman, *American Institute of Architects*, August 1972.

**T & B**
T & B/Westline in *Safety Supply Canada Catalogue*, 1984.

**TFSP**
"Toshiba's Factory Safety Pictograms" by Sawahashi Wataru and Tanaka Kunihiko, *Graphic Design* No. 63, September 1976.

**Un**
Source unknown.

**Ur**
Dieter Urban and Erhardt D. Stiebner, *Signs and Emblems*, Van Nostrand Reinhold Company, New York, 1984.

**Ur/CHBA**
Children's Hospital of Buenos Aires, Hospital Departments. Design: Guillermo Gonzales Ruiz, Gabriel Ezcurra. *Signs and Emblems*, Van Nostrand Reinhold Company, New York, 1984.

**Ur/DOT'72**
Department of Transportation, U.S., 1972. *Signs and Emblems,* Van Nostrand Reinhold Company, New York, 1984.

**Ur/FUB**
Free University of Brussels. Design: Sami Alowf and Sophie Bertot. *Signs and Emblems*, Van Nostrand Reinhold Company, New York, 1984.

**UAH**
University of Alberta Hospitals, Canada. Design: Annie Re, 1984.

**UBP**
Umi-no-Nakamichi Beach Park 1980. Design: Sadamura Toshimitsu and Sato Masaru. *Graphic Design* No. 86, June 1982.

**UNESCO**
UNESCO 1953, Glyphs #12, *Graphic Design* No. 49, March 1973.

**UNI**
Ente Nazionale
Italiano Di Unificazione

**US Army**
U.S. Army, *Hazardous Materials* by Gene P. Carlson and Warren E. Isman, Glencoe Publishing Co. Inc., California, U.S.A., 1980.

## Abbreviations and notes about the sources of symbols

**USDC**
U.S. Department of Commerce, *Symbols for Industrial Safety, NBSIR 82-2485.*

**USDT**
Department of Transportation, U.S.A. 1974 and 1981. *Symbol Signs*, prepared by the American Institute of Graphic Arts, 1981.

**Willson**
Willson Safety Products, Pennsylvania, U.S.A.

**WC'78**
Soccer World Cup '78, Argentina. Design: Carlos A. Méndez-Mosquela and Gui Bonsiepe. *Graphic Design* No. 69, March 1978.

**WCB**
Workers' Compensation Board of British Columbia, Canada.

**WCMHSC**
Walter C. Mackenzie Health Sciences Centre, Alberta, Canada. Design: P. Bartl, G. Prygrocki and W. Jungkind. *University of Alberta Hospitals Signage System Design Guide*, 1983.

**ZHR**
Maria Del Carmen Zilio, Osvaldo Hartenstin and Rafael Rodrigues, *Graphic Design* No. 60, December 1975.

**AIGA/CSS**
Canadian National Signing System, Canada.

**AIGA/FA**
Frankfurt Airport, Federal Republic of Germany.

**AIGA/MM**
Mexico City Metro, 1969.

**Eas/B & M**
Braunstein and McLaren, pictograms, 1979.

**Eas/BR**
British Rail, Corporate identity programme, 1975/76.

**Eas/CSN**
Safety Symbols and Signs, Czechoslovakia, 1966.

**Eas/CT**
Canada Transport, Pictogrammes, public information.

**Eas/ENFI**
Groupe ENFI Design, "Beaufourg" symbols, 1979.

**Eas/ICOG**
Frascara, ICOGRADA student symbols, 1978.

**Eas/ISO**
International Organization for Standardization, Draft, safety colours and safety signs, 1975.

**Eas/LT**
London Transport, Basic elements pictogrammes, 1977.

**Eas/PTCNSW**
Public Transport Commission of New South Wales, International Symbols and PTC signs, 1979.

**Eas/SELLO**
Sellotape, 'Sellosign' hazard signs.

**Eas/SFS**
Suomen Standardisoimisliitto, Finland, Doc. SFS 3854, 1979.

**Eas/SIM**
Simlinger Peter, Public information symbol designs, 1979.

**Eas/UIC**
Union Internationale des Chemin de Fers, France, Symbols used on railways, 1979.

**Eas/USDT**
United States Department of Transport, Symbol Signs, 1979.

## Abbreviations and notes about the sources of symbols

**Eas/WC**
World Cup, Argentina, 1978.

**Mod/ADCA**
Australian Department of Civil Aviation.

**Mod/ADV**
German Airport Authority.

**Mod/ATA**
Air Transport Association.

**Mod/BAA**
British Airports Authority.

**Mod/D/FW**
Dallas-Fort Worth.

**Mod/IATA**
International Air Transport Association.

**Mod/ICAO**
International Civil Aviation Organization.

**Mod/KFAI**
Sweden.

**Mod/NPS**
National Park Service.

**Mod/NRR**
Netherlands Railroad.

**Mod/O'64**
Olympic Games, Tokyo, 1964.

**Mod/O'68**
Olympic Games, Mexico, 1968.

**Mod/O'72**
Olympic Games, Munich, 1972.

**Mod/Pg**
Picto'grafics.

**Mod/PORT**
Port Authority of New York and
New Jersey.

**Mod/SP**
Swedish Standard Recreation Symbols.

**Mod/S/TA**
Seattle-Tacoma Airport.

**Mod/TA**
Tokyo Airport.

**Mod/TC**
Transport Canada, Airports.

**Mod/UIC**
International Union of Railways.

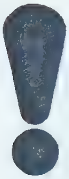
**Mod/WO'72**
Winter Olympic Games, Sapporo, 1972.

**Mod/X'67**
Expo 67, Montreal.

**Mod/X'70**
Expo 70, Osaka.

## Hazards (Warning)

## **General hazard** 101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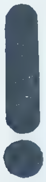
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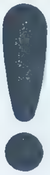
1978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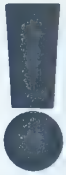
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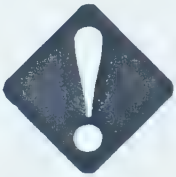
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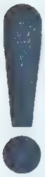
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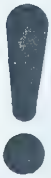
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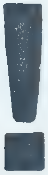
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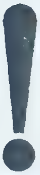
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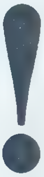
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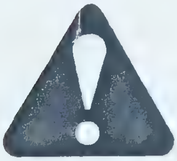
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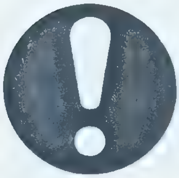
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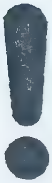
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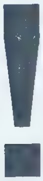
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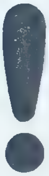
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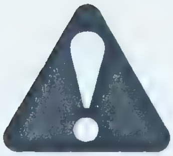
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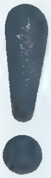
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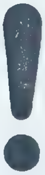
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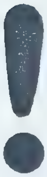
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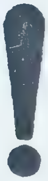
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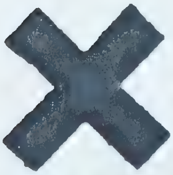
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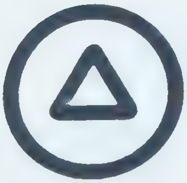
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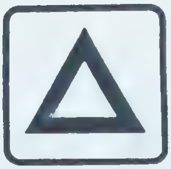
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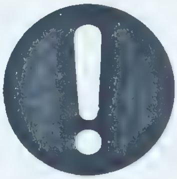
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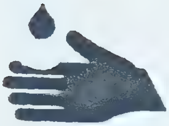
1984

UNI

## Hazards (Warning)

## **Corrosive/caustic/acid** 102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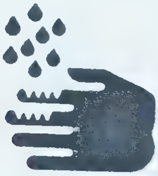
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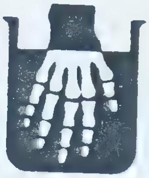
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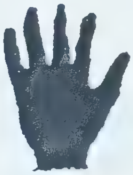
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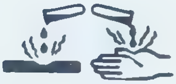
1978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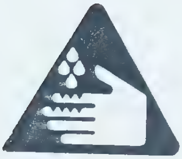
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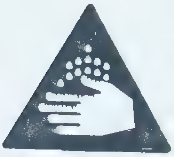
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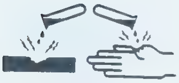
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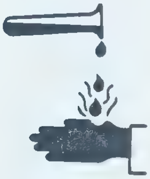
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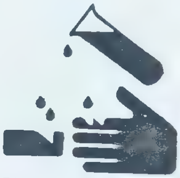
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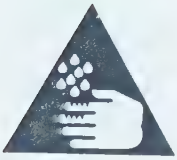
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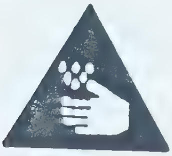
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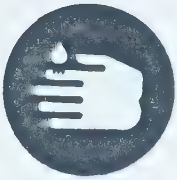
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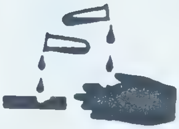
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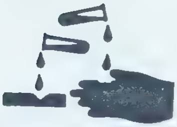
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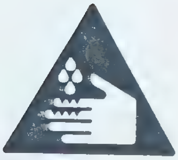
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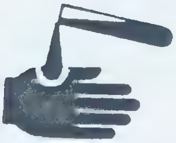
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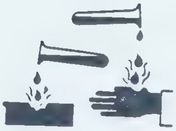
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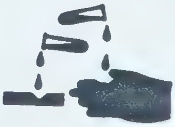
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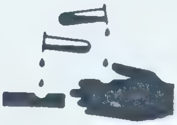
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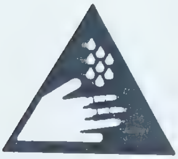
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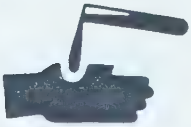
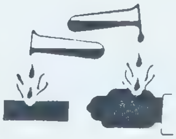
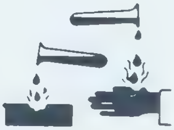
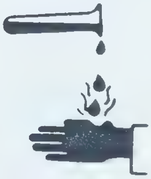

Stone

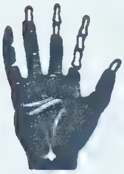

HISH


FFA

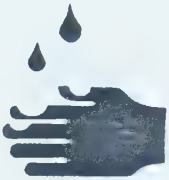

FFA

Hazards (Warning)

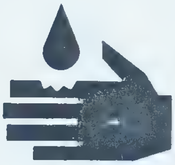
**Corrosive/ caustic/ acid** 102



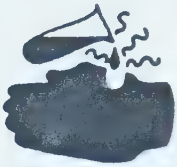
Dreyfuss



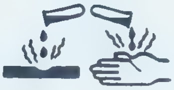
SABS
1978



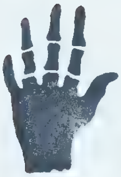
OD



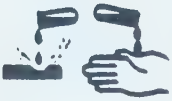
Adkins



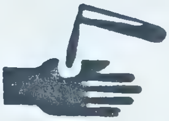
Un



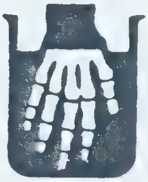
Un



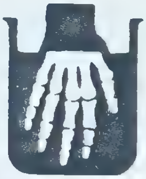
Un



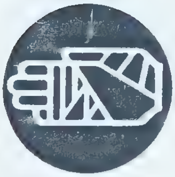
Un



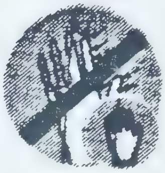
Un



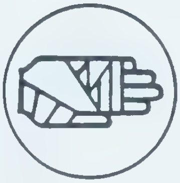
Un



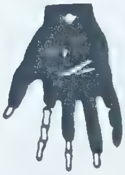
USDC



LSS
1984

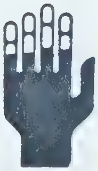


Collins

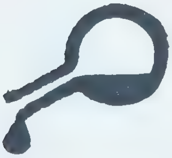


Collins

UNI

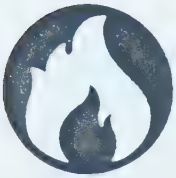


ERCO

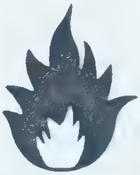


DSC

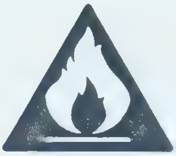
## Hazards (Warning)
## **Flammable** 103



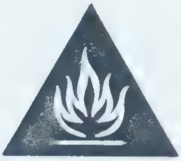
USDC



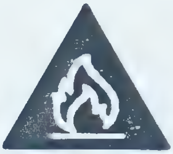
WCB



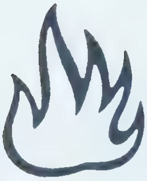
Brady
1978



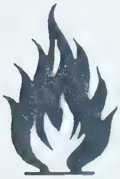
FIP
1980



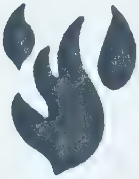
SCC



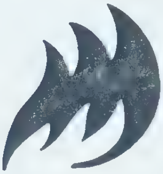
NM



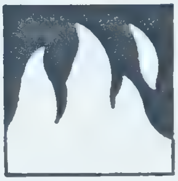
HISH



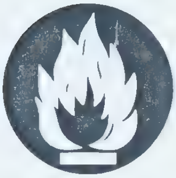
Brady
1978



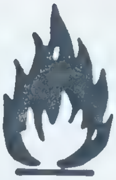
OD



IVDS
1974

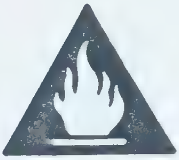


MSA

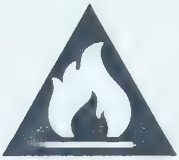


DS
1981

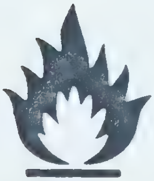
ERCO



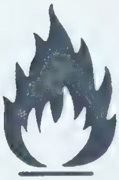
CSAO
1984



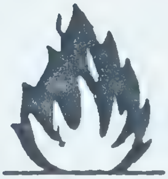
LSL



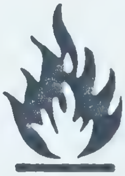
BS
1980



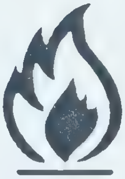
FFA



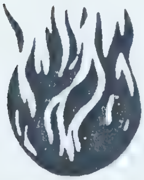
FFA



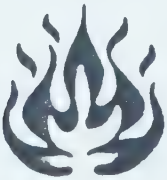
SaSo



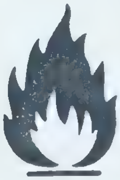
SABS
1978



Best



Un

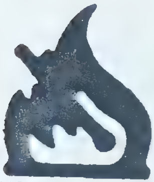


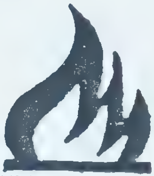
Un

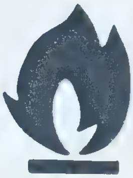
Un

Un

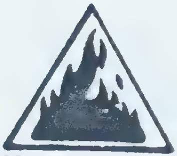
## Hazards (Warning)
## **Flammable** 103

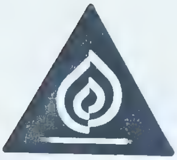

USDC


UNI

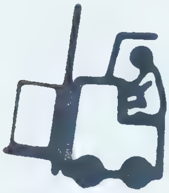

Picto

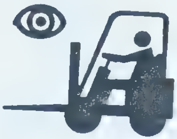
ISO
1984

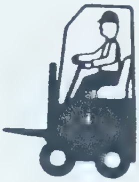

SEMEX

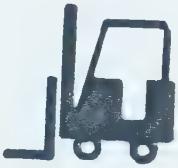

SSC
1984

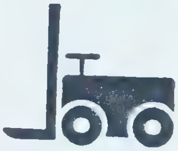
## Hazards (Warning)
## **Fork lift trucks** 104

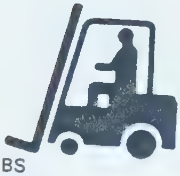

Focal
1984

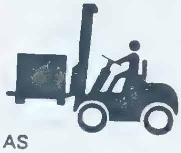

WCB

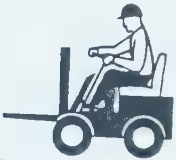

T& B
1984

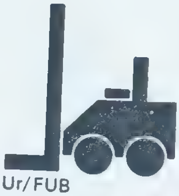

USDC

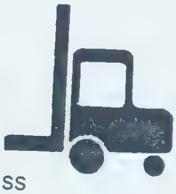

ERCO

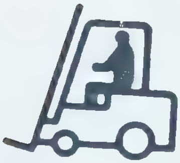

BS
1980

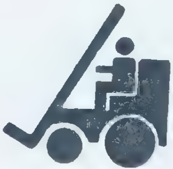

AS
1983

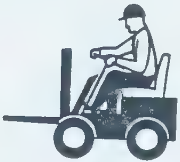

Dreyfuss

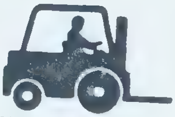

Ur/ FUB

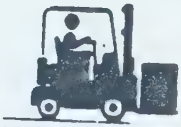

SS

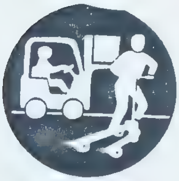

DS
1981

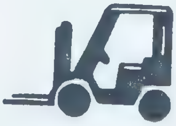

Picto

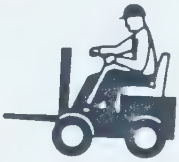

SIS
1967

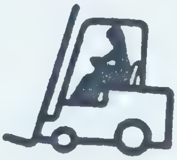

NBN
1983

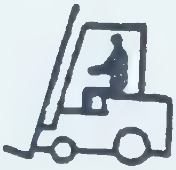

Brady
1984

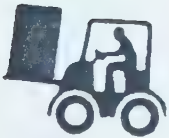

USDC


Stone

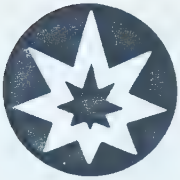

FFA

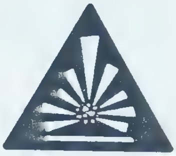

Un

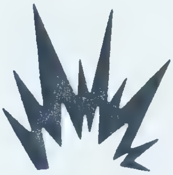

UNI

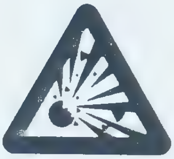

SEMEX

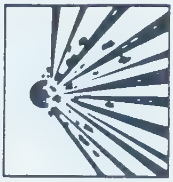
## Hazards (Warning)
## **Explosive** 105

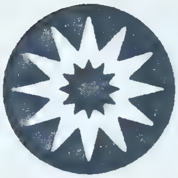

USDC

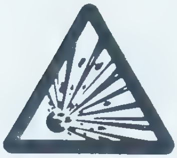

Brady
1978


FMC


Picto


Collins


Spect 70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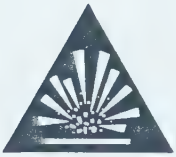
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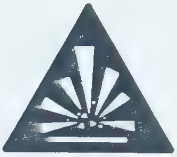
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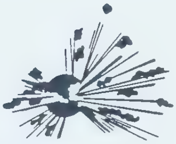
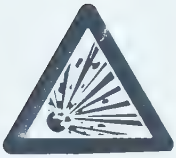

SIS
1967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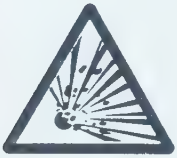
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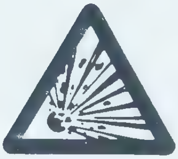
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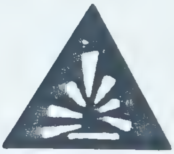
1983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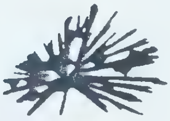
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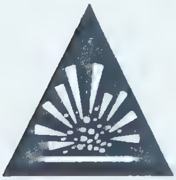
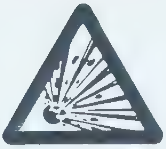

Pg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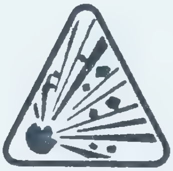
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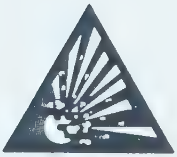
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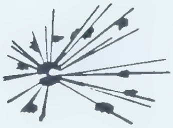
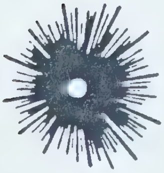
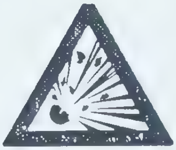
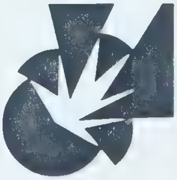

Stone


Brady
1984


SABS
1978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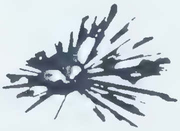
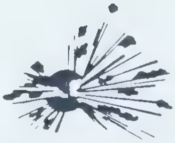
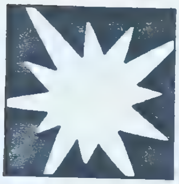
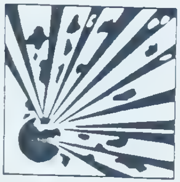
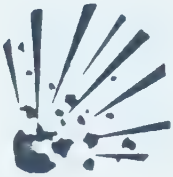

SaSo


FFA

## Hazards (Warning)
## **Explosive** 105


IVDS
1974


Un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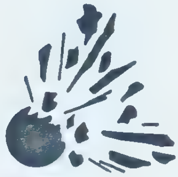
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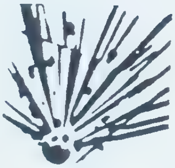
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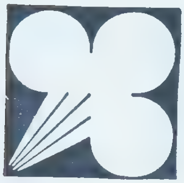
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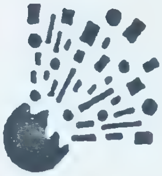
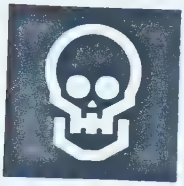
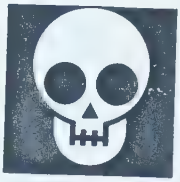

UNI

## Hazards (Warning)
## **Poison** 106


Pg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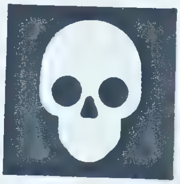
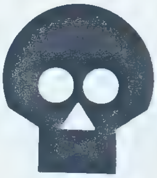
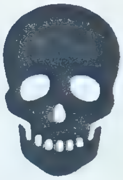
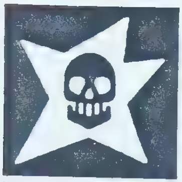
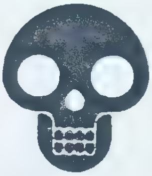

IVDS
1974


Ur/FUB


Mod


SE
1978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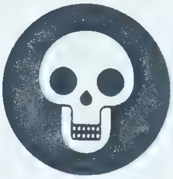
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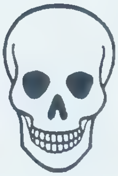
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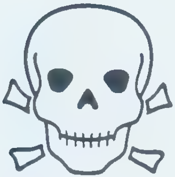
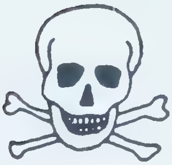

SIS
1967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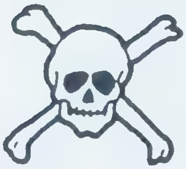
1981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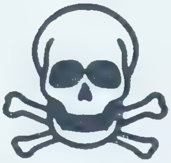
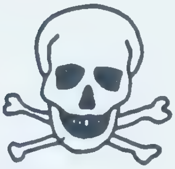

BS
1980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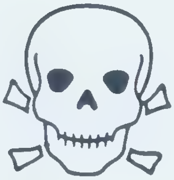
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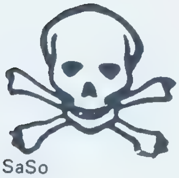
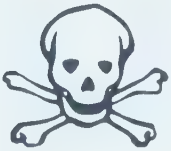

SaSo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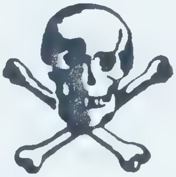
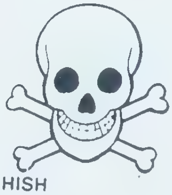

Brady
1984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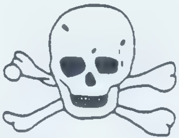
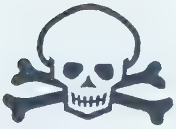
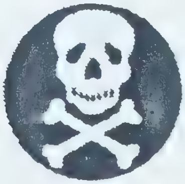
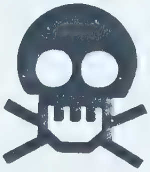

Stone


SABS
1978


LSS
1984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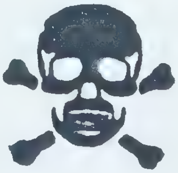
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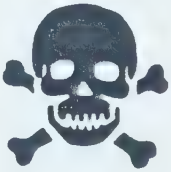
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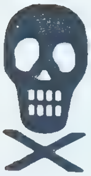
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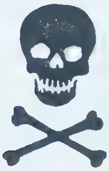
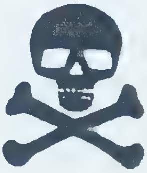
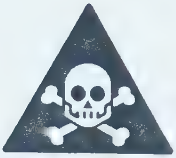
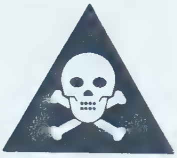
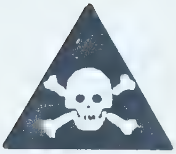

Dreyfuss


SS


SSC
1984


FIP
1980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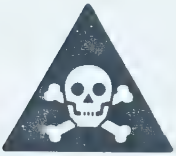
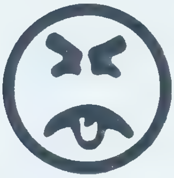

Brady
1984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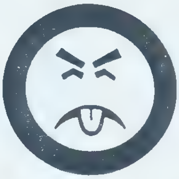
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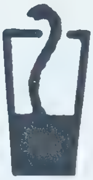
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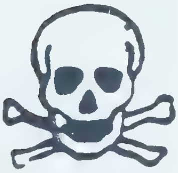
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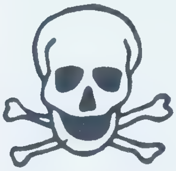
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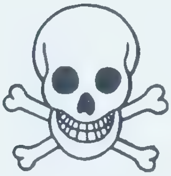
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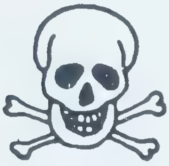
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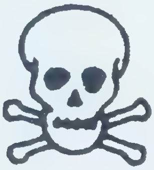
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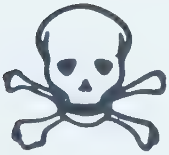
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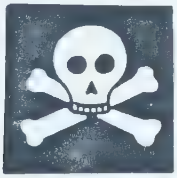
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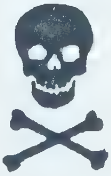
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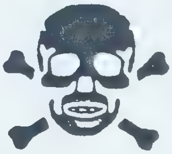
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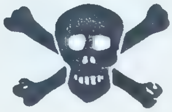
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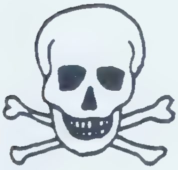
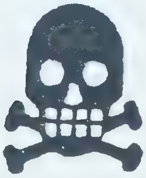
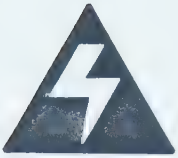
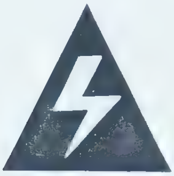

ISO
1984

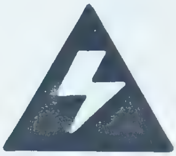

UNI

Hazards (Warning)

## **Electric shock/ high voltage** 107


SSC
1984


SSC
1976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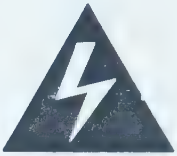
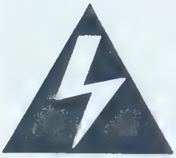

FIP
1980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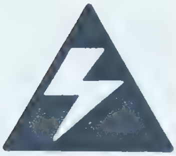
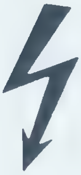
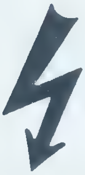

Pg


DS
1981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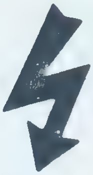
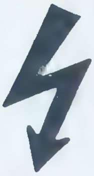
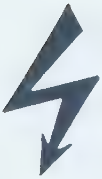
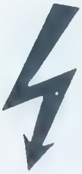
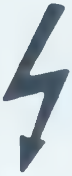
1983

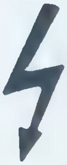

BS
1980

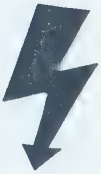

NBN
1983

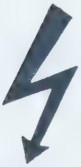

Adkins

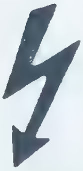

SIS
1967

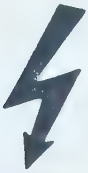

MSA

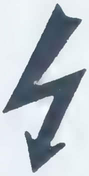

PSS

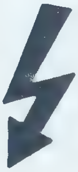

Picto

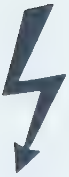

SABS
1978

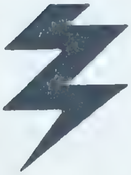

Dreyfuss

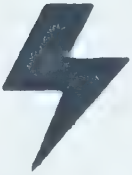

Dreyfuss

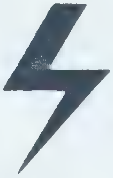

ISO
1984

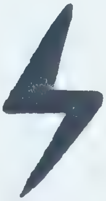

Print


FFA


HS

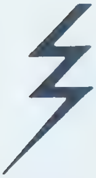

LSS
1984

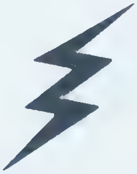

Pg


T& B
1984

Hazards (Warning)

## **Electric shock/high voltage** 107


Mod/X'67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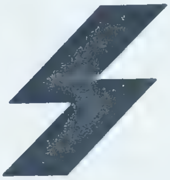
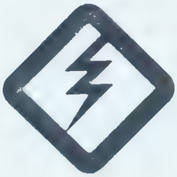

Ur/FUB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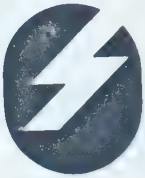
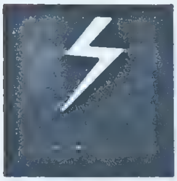
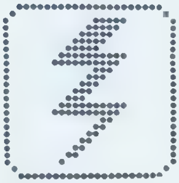

CNSS


O'76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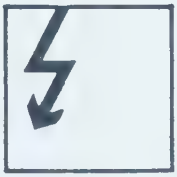
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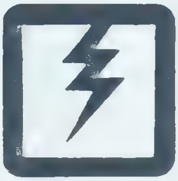
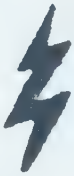
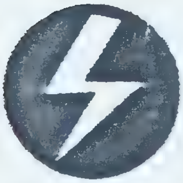
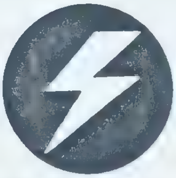

KPIE
1981


DSC


LSS
1984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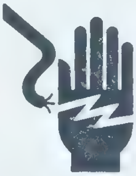
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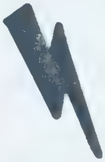
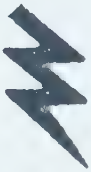
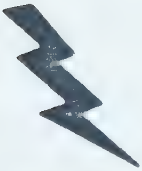
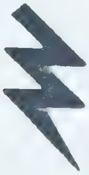
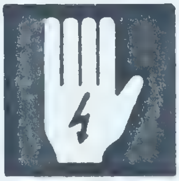
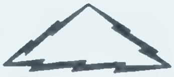

RAPS

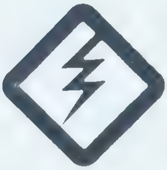

LSS
1984


Brady
1984


Dreyfuss


T& B
1984


Un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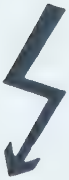
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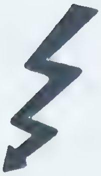
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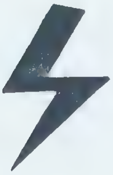
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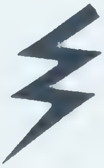
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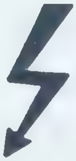
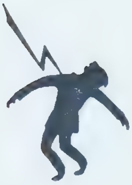

Un

## Hazards (Warning)
## **Electric shock/ high voltage** 107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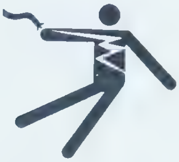
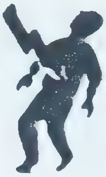
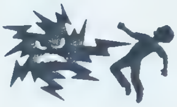
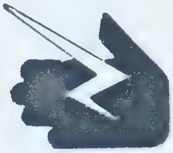
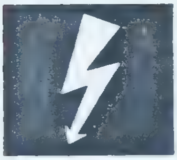
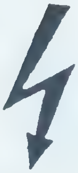

FMC

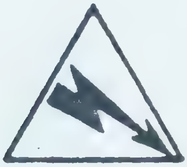

ADI

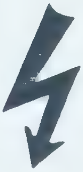

Brady
1984

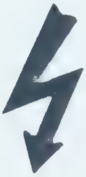

PS


WCB


UNI


SEMEX

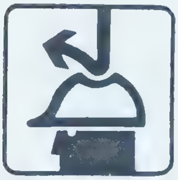

Un

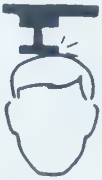

Un

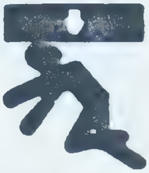
Hazards (Warning)

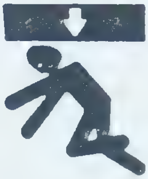
## Overhead hazard/ mind your head 108

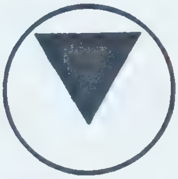
108.1

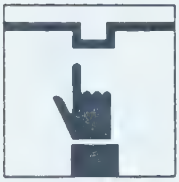

FMC


BS
1982


LSS
1984


Stone


USDC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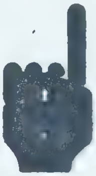
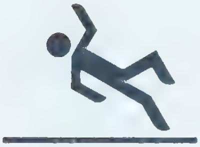
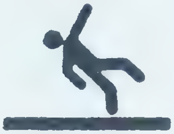
WCB

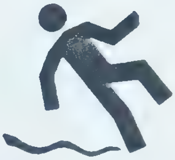

T&B
1984

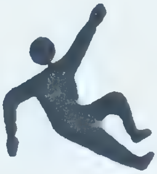
Hazards (Warning)

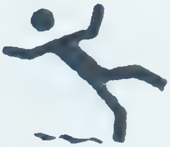
## Slippery/danger of falling 109

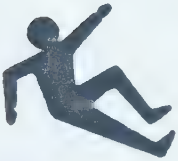

FIP
1980

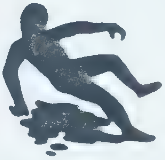

SS

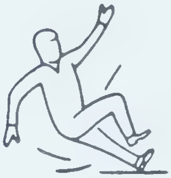

Brady
1978

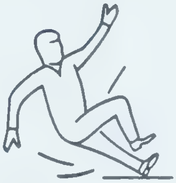

USDC

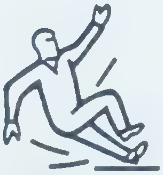

SLL
1984

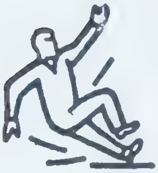

SaSo

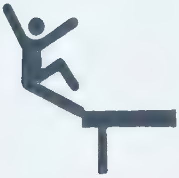

BS
1982

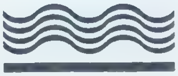

FFA

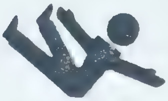

SIS
1967

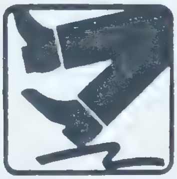

Dreyfuss

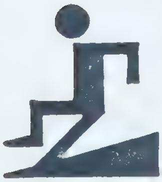

SW

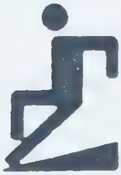

USDC

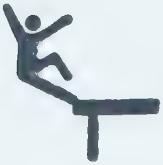

NM

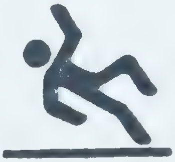

Brady
1984

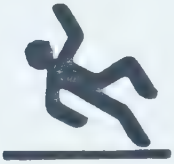

USDC

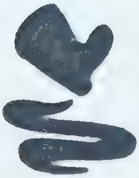

Adkins


Dreyfuss

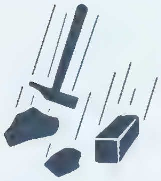

Un

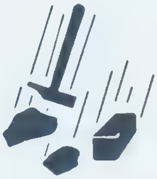

Un

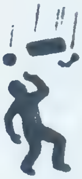

Un

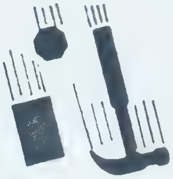

USDC

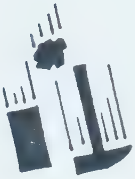
## Hazards (Warning)
## **Falling objects** 110


SIS
1967


FFA


Focal
1984

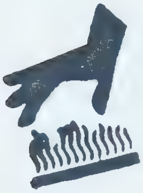

WCB


Un

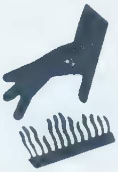
Dreyfuss

Hazards (Warning)

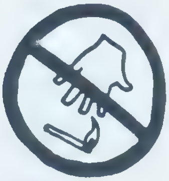
## Hot surface/ danger of burns 111



USDC



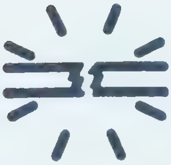
Stone



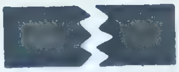
Dreyfuss

Hazards (Warning)

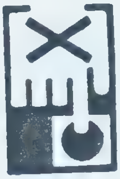
**Out of order** 112



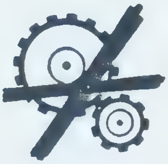
Eas/ICOG
1978



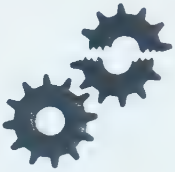
Eas/ICOG
1978



Eas/ICOG
1978

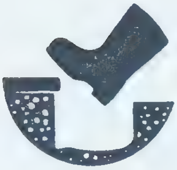


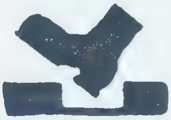
Eas/ICOG
1978

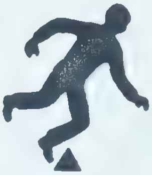


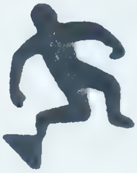
Eas/ICOG
1978

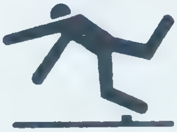
## Hazards (Warning)
## **Trip hazard** 113

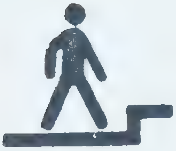

USDC

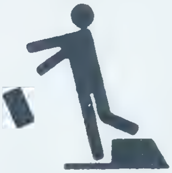

SCC

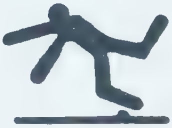

BS
1982


Un


Stone

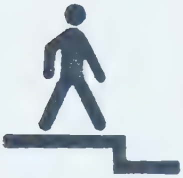

SS


Dreyfuss

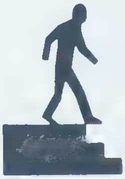

Un

Hazards (Warning)

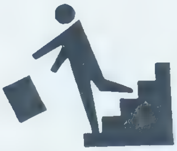
## **Beware of steps** 114



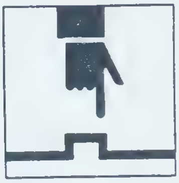
SS



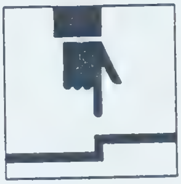
SaSo



WCB



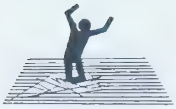
Aureli



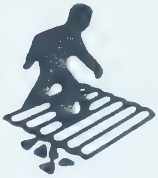
Aureli

Hazards (Warning)

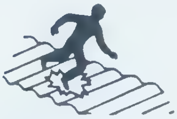
**Fragile roof** 115



SABS
1978



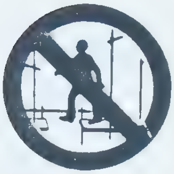
Focal
1984



BS
1982

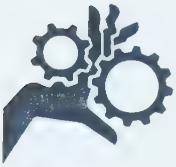
Hazards (Warning)

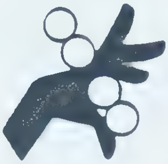
## **Scaffolding incomplete** 116

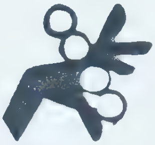


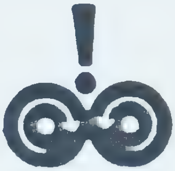
SLL
1984

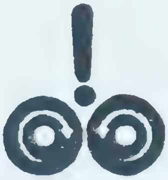
## Hazards (Warning)
## **Entanglement/crushing** 117

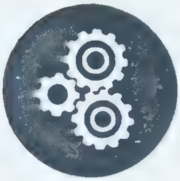

Collins

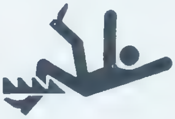

Stone

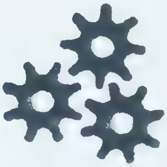

USDC


Dreyfuss


Dreyfuss

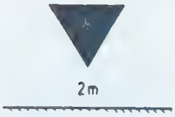

USDC


Collins

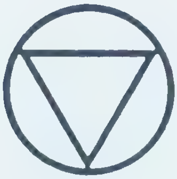

SCC

Hazards (Warning)

## **Limited overhead height** 118



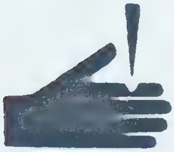
BS
1982

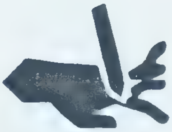


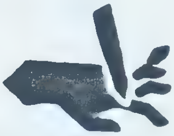
PrS

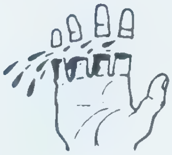
Hazards (Warning)

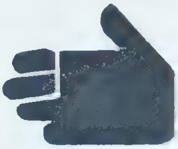
## **Sharp surface/cut** 119

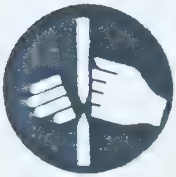

Dreyfuss

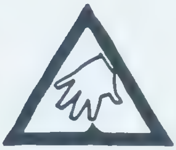

FMC

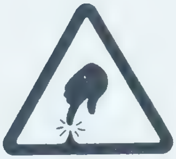

Un


Mar


PS

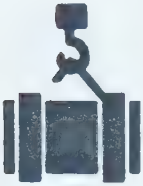

KT


Dreyfuss

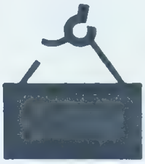

Adkins

Hazards (Warning)

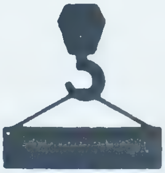
## **Overhead crane** 120



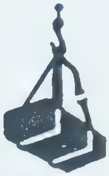
Picto



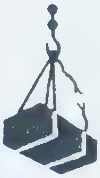
OD



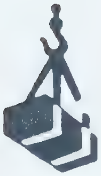
Dreyfuss



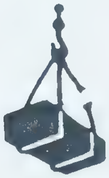
NBN
1983



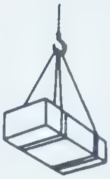
SABS
1978



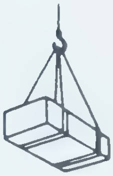
USDC



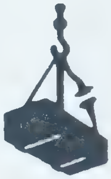
DS
1981



SIS
1967

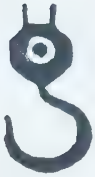


FFA

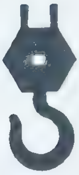


BS
1980

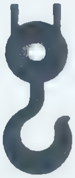
UNI



SCC

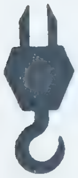


SSC
1984

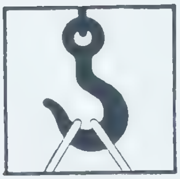


Brady
1978

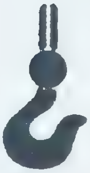
FIP
1980



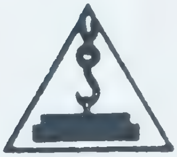
Pg



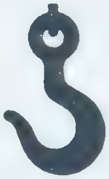
ERCO



SS



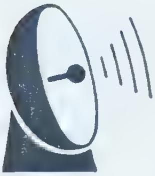
SEMEX



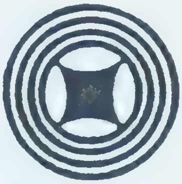
Un

Hazards (Warning)

## **Micro-wave** 121



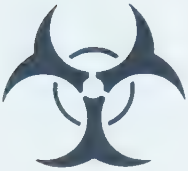
REDR
1970



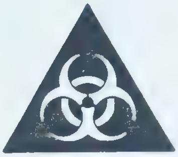
LSS
1984

Hazards (Warning)

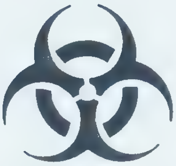
## **Biological hazard** 122



Un



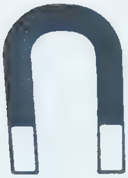
FIP
1983

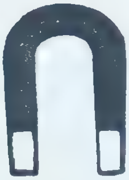


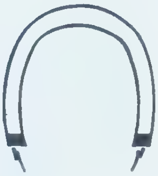
Adkins

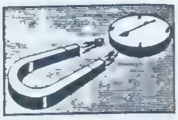
Hazards (Warning)

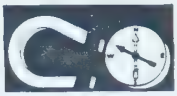
## **Magnetic field** 123

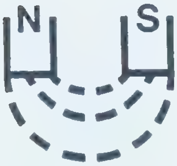

BS
1982


Focal
1984

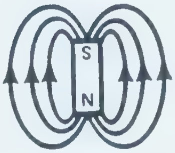

NEMA
1984


LCII

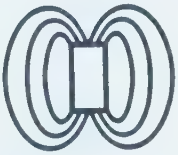

IATA

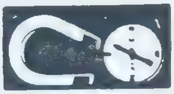


UAH

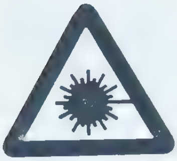


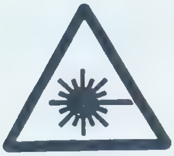
Dreyfuss

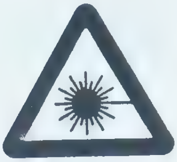

WCMHSC
1984

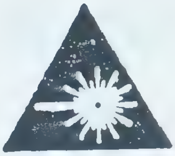

Dreyfuss

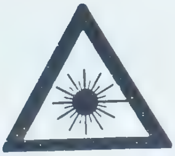
## Hazards (Warning)
## **Laser** 124

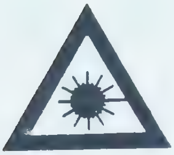

NBN
1983

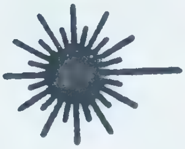

BS
1980

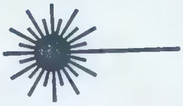

Picto

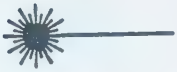

SCC

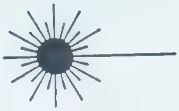

SABS
1978

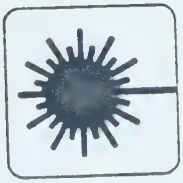

FFA

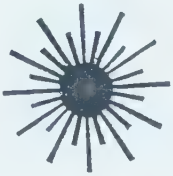

LSS
1984

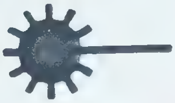

FIP
1980

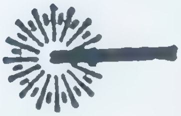

Un


Adkins

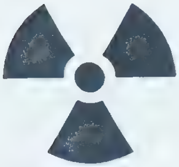

Best

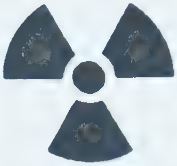

Un

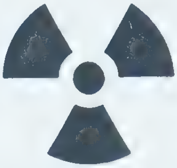

Stone

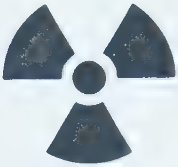

UNI

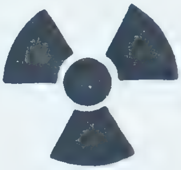
## Hazards (Warning)
## **Radiation** 125

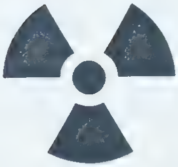

Adkins

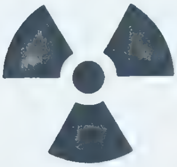

BS
1980

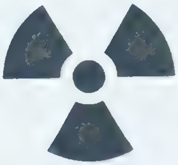

LSL

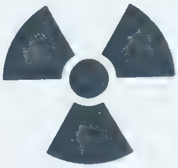

SIS
1967

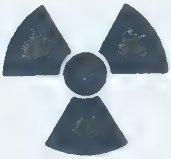

Brady
1978

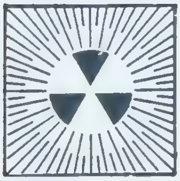

WCB

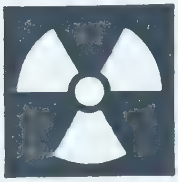

Dreyfuss

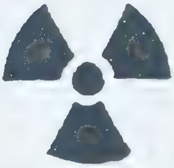

FFA


Ur/FUB


Un

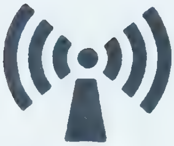

ERCO


Un


UNI

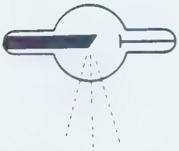
Hazards (Warning)

## **Non-ionizing radiation** 126



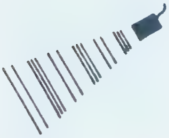
BS
1982

Hazards (Warning)
**X-Ray** 127



REDR
1970

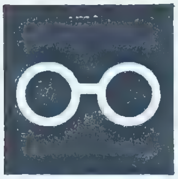
Hazards (Warning)
**Ultra-sound** 128

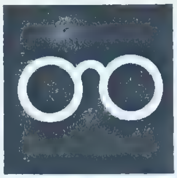


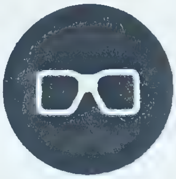
REDR
1970

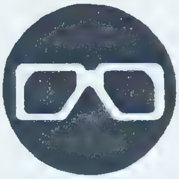
Protection

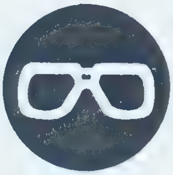
## **Eye protection** 201

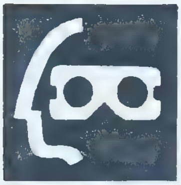

IVDS
1974

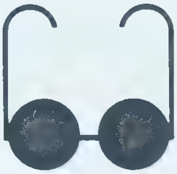

DSM

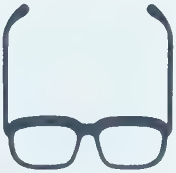

Un

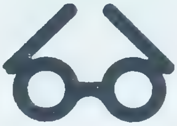

KT

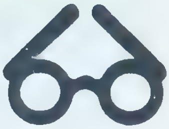

SABS
1978

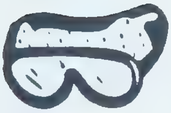

PS

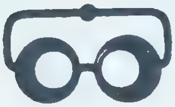

TFSP

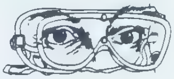

TFSP

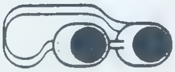

Pg

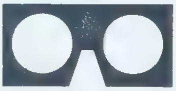

USDC

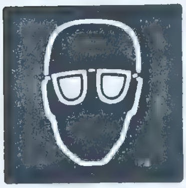

USDC

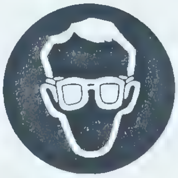

Un

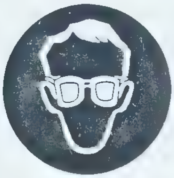

Mar

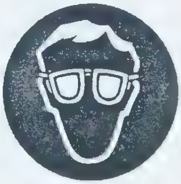

ERCO


OD


PSS


DS
1981


AS
1983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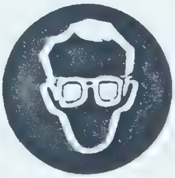
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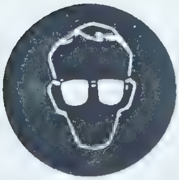
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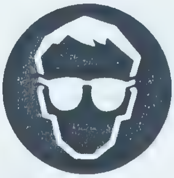
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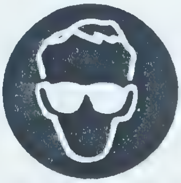
1983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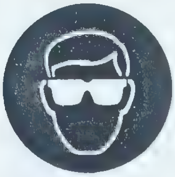
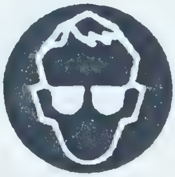

BS
1980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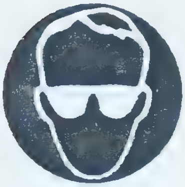
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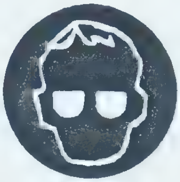
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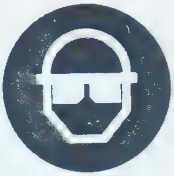
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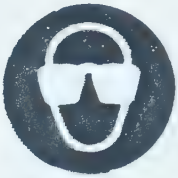
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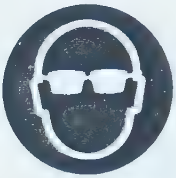
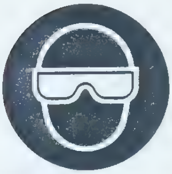

Brady
1978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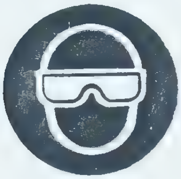
1980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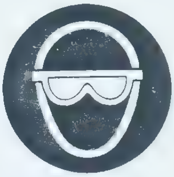
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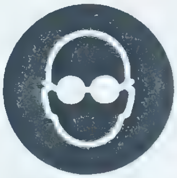
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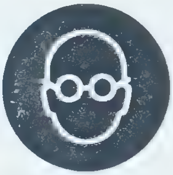
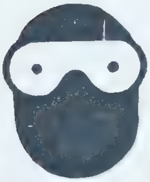
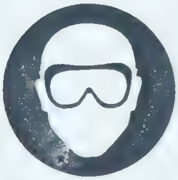

SSC
1984


T& B
1984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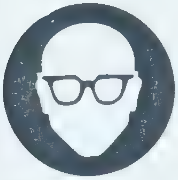
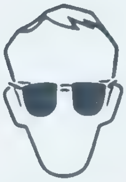
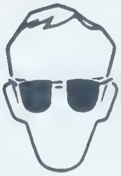

LSL


FFA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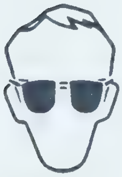
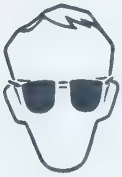

Dreyfuss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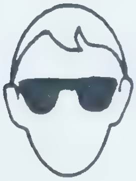
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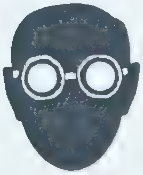
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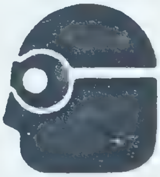
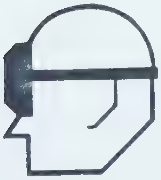

LSS
1984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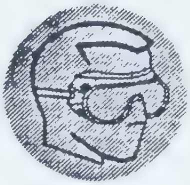
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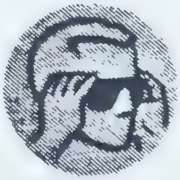
1984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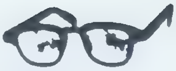
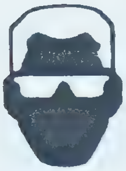
1984


ISSC
1985

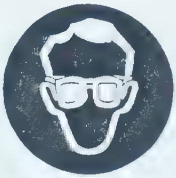
SSC
1984

Protection

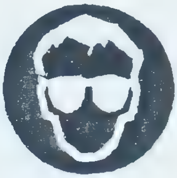
**Eye protection** 201



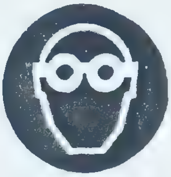
Brady
1978



ISO
1984



Letraset
1983



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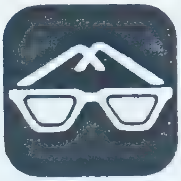
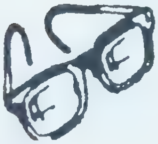


Willson



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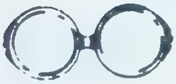

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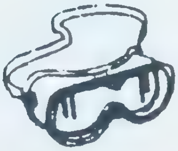
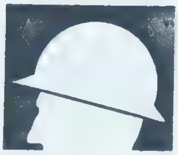
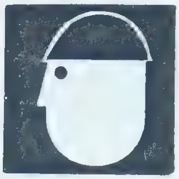


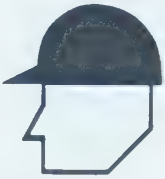
SEMEX

## Protection
## **Hard hat area** 202

IVDS
1974


WCB


T& B
1984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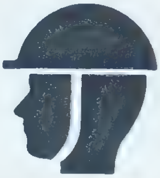
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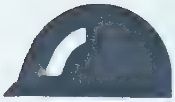
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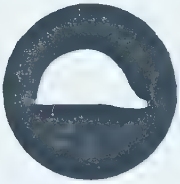
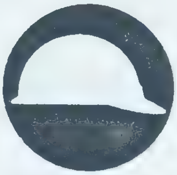
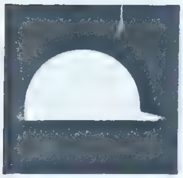

USDC


Spect 70

SABS
1978

ERCO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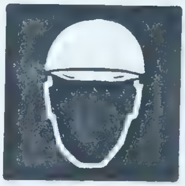
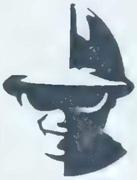
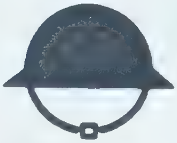
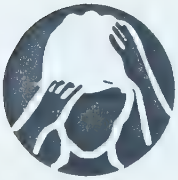

PSS


ISSC
1985

Brady
1984


Dreyfuss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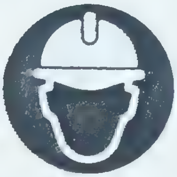
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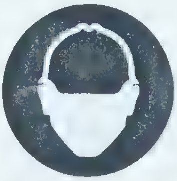
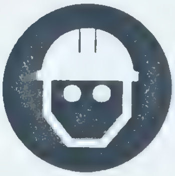
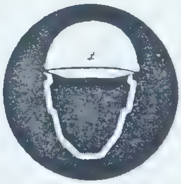

LSL


Picto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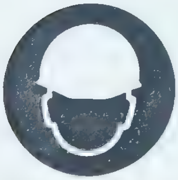
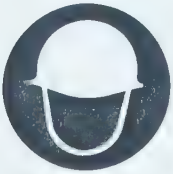
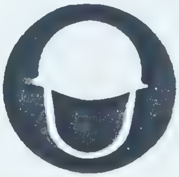

SSC
1984


FIP
1980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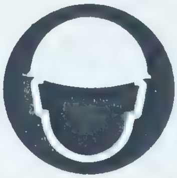
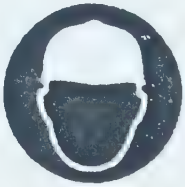
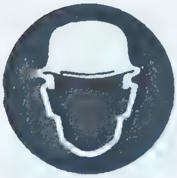

Brady
1978


Focal
1984

Protection

**Hard hat area** 202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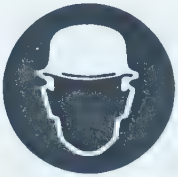
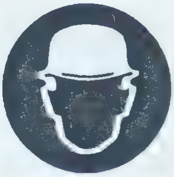
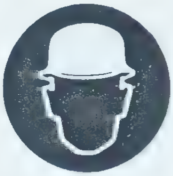

NBN
1983


USDC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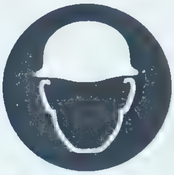
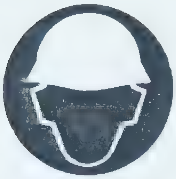
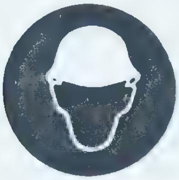
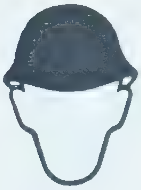
1983

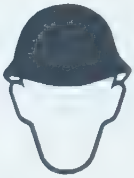

BS
1980

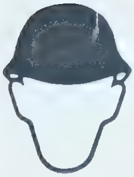

Stone

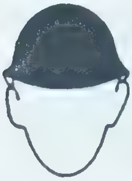

BS
1980

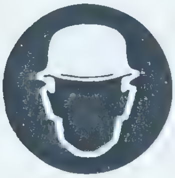
NM

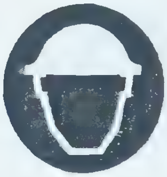

Dreyfuss


SIS
1967


FFA


SaSo


ISO
1984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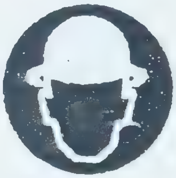
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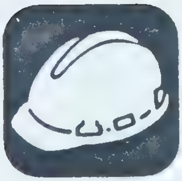
1983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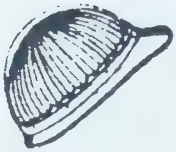
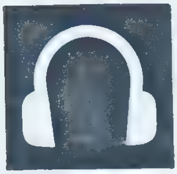

SEMEX

SEMEX

Protection

## **Hearing protection** 203



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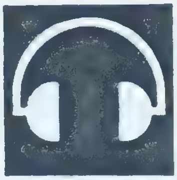

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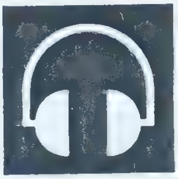

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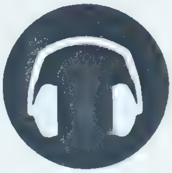

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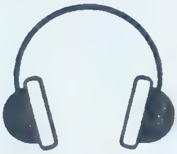

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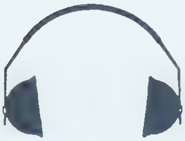

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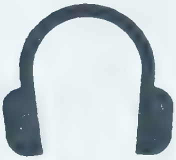
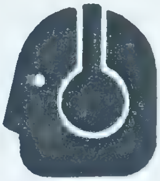
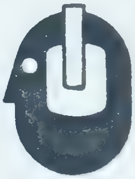
1985



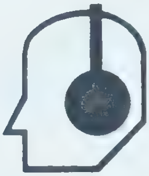
Pg



LSS
1984



T&B
1984



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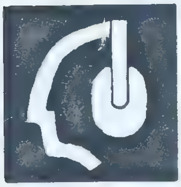

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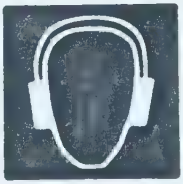

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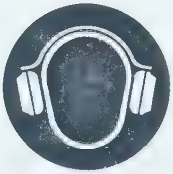

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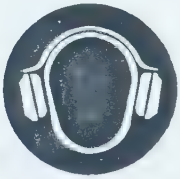

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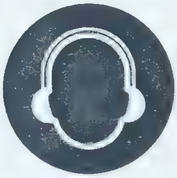
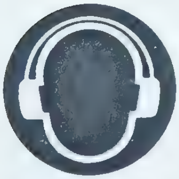
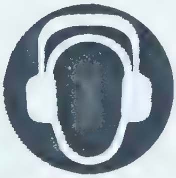


SSC
1984



Brady
1978



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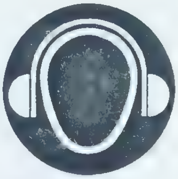
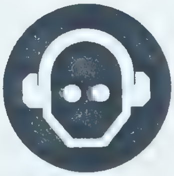
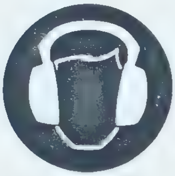


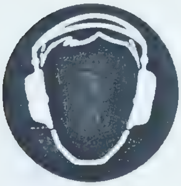
CSAO
1984



Picto



NBN
1983



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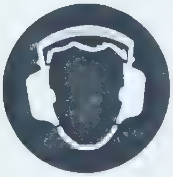
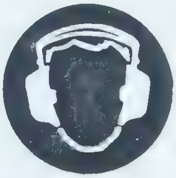


AS
1983



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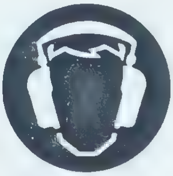

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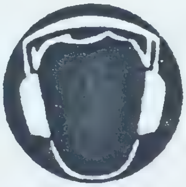
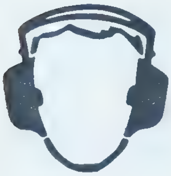
1983



Focal
1984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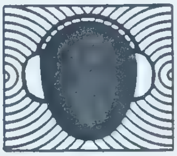
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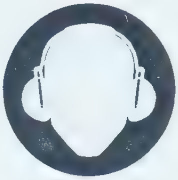
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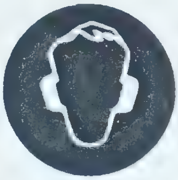
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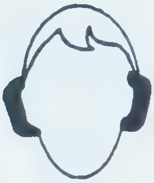
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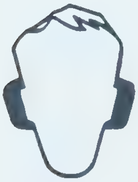
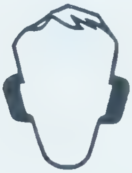

Dreyfuss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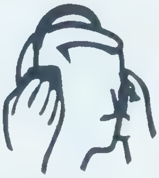
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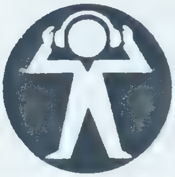
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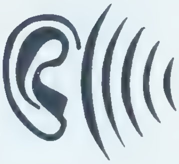
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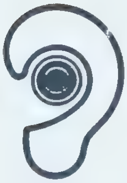
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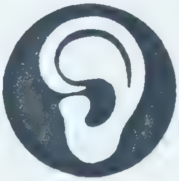
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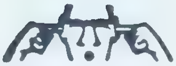
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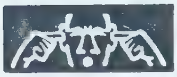
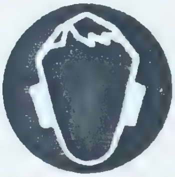

Focal
1984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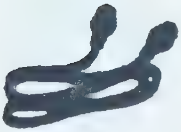
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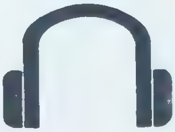
1985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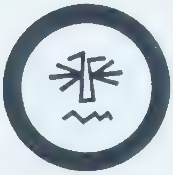
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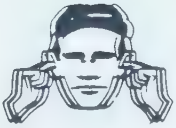
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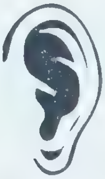
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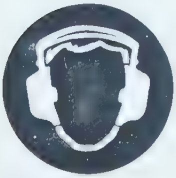
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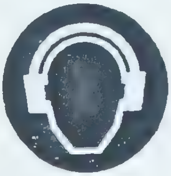
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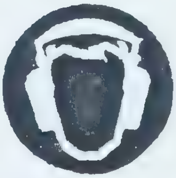
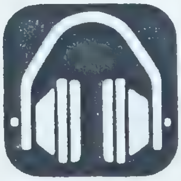

Letraset
1983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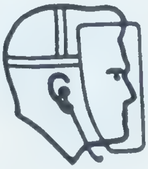
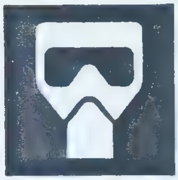

DSC

Protection
**Respirator required** 204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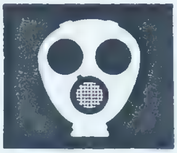
1974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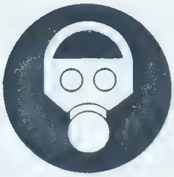
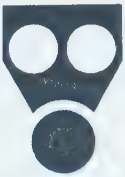

Picto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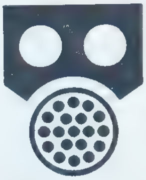
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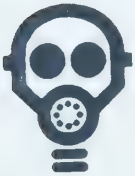
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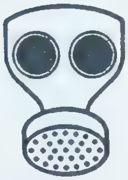
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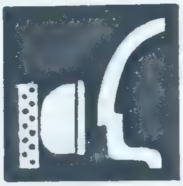
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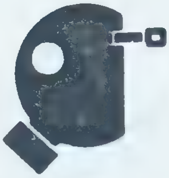
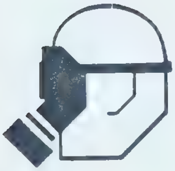

Dreyfuss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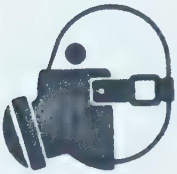
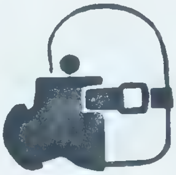
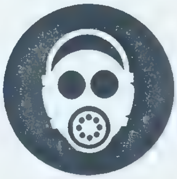
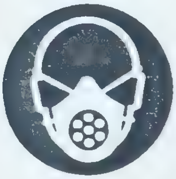
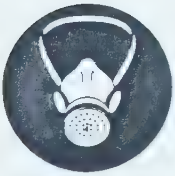
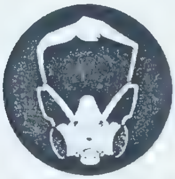

T&B
1984

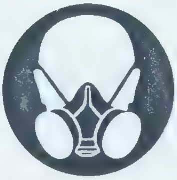

LSS
1984


SSC
1984


Brady
1978


SABS
1978


MSA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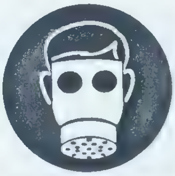
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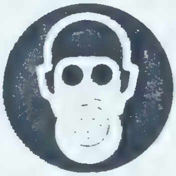
1983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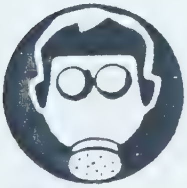
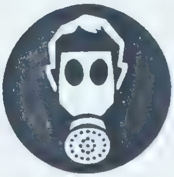
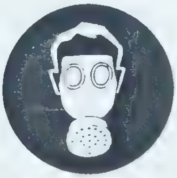

Focal
1984


NBN
1983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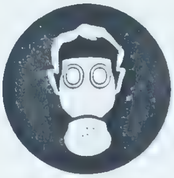
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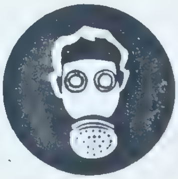
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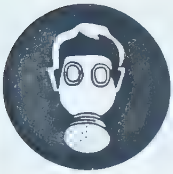
Protection

**Respirator required** 204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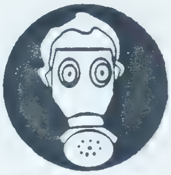
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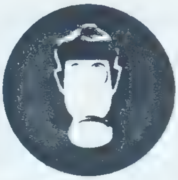
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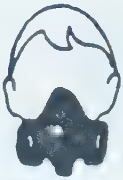
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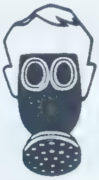
SIS
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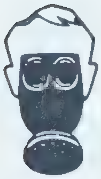
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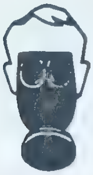
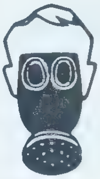

Dreyfuss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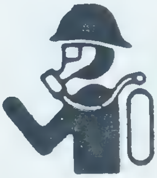
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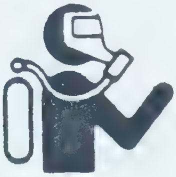
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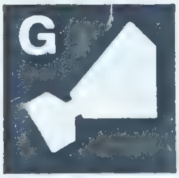

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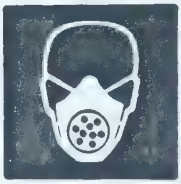
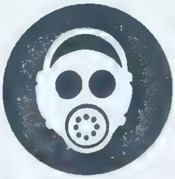
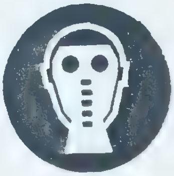

PSS


USDC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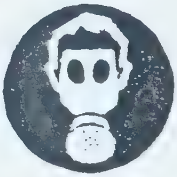
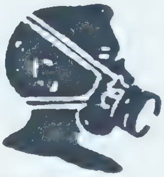

Letraset
1983

DSC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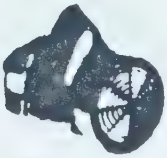
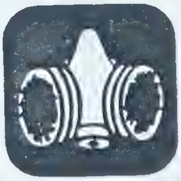

SEMEX


Willson

Protection

## **Foot protection required** 205

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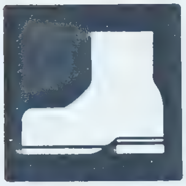
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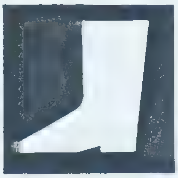
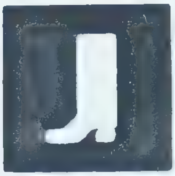
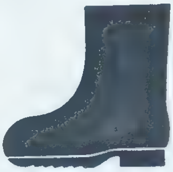

DSM


T&B
1984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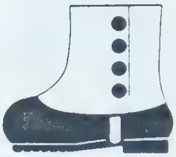
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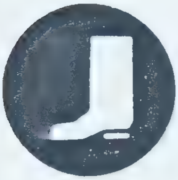
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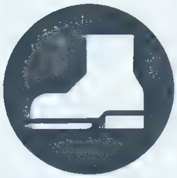
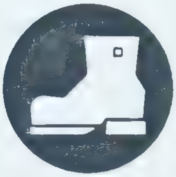
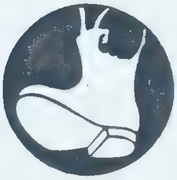

SSC
1984


NBN
1983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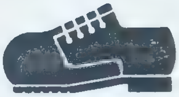
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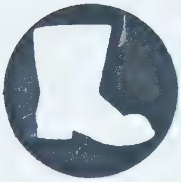
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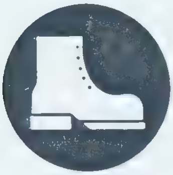
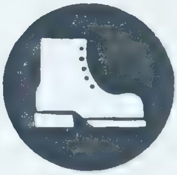

FIP
1980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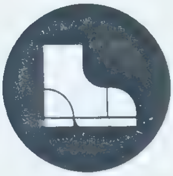
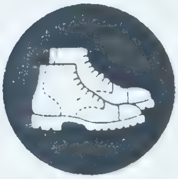
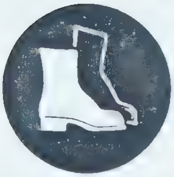
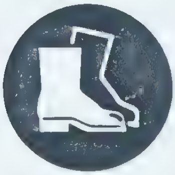
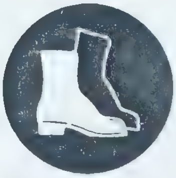
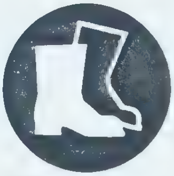

Picto


SABS
1978


AS
1983


BS
1980


DS
1981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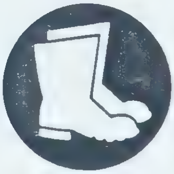
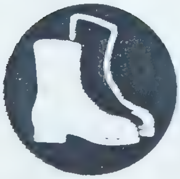
1983


SABS
1978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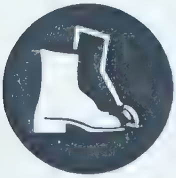
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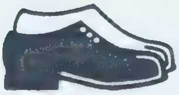
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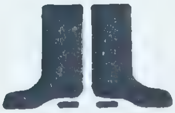
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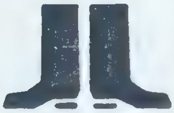
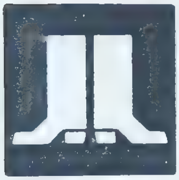
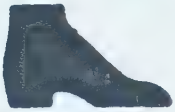

Dreyfuss

Protection
**Foot protection required** 205



T&B
1984

WCB



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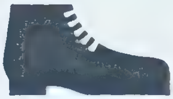
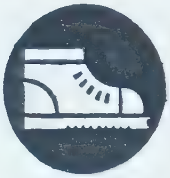
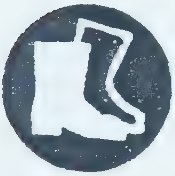


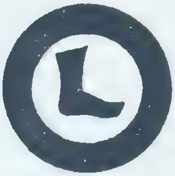
Dreyfuss



UNI



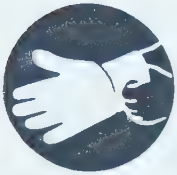
Letraset
1983

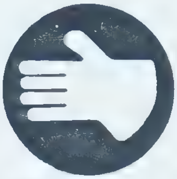


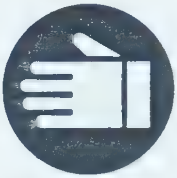
SEMEX

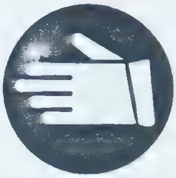
Protection

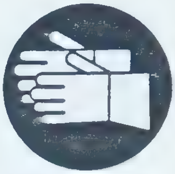
## Hand protection required 206

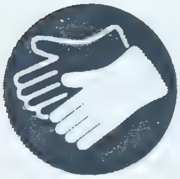

USDC

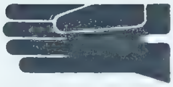

USDC


SSC
1984


Brady
1978


SABS
1978


SS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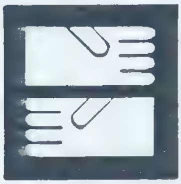
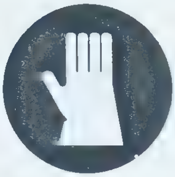

PS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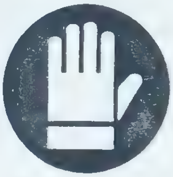
SSC
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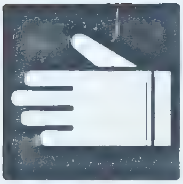
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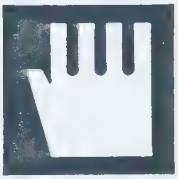
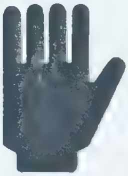

DSM

TFSP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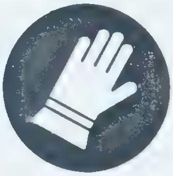
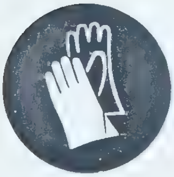
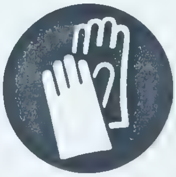
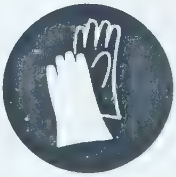
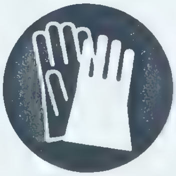

FIP
1983


AS
1983


BS
1980


DS
1981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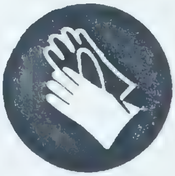
1983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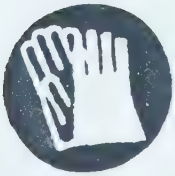
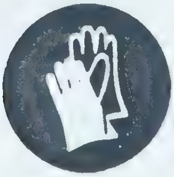
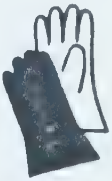
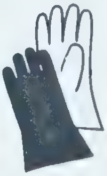
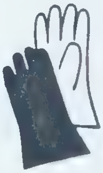

Letraset
1983


Un

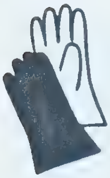

SaSo


SIS
1967

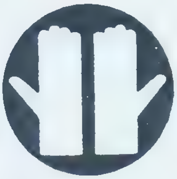

FFA

Protection

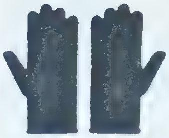
## **Hand protection required** 206



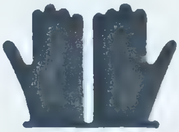
Dreyfuss



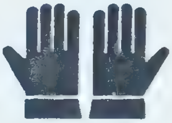
Stone



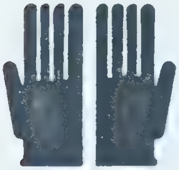
Dreyfuss



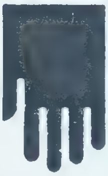
Adkins



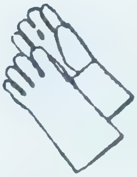
WCB



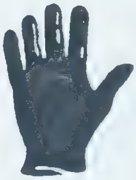
T&B
1984



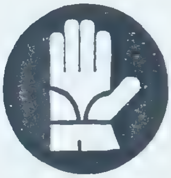
Pg



SEMEX



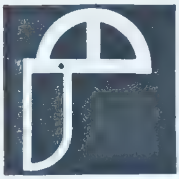
SEMEX



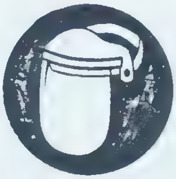
UNI

## Protection

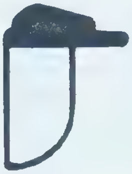
## **Face protection required** 207



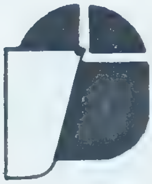
DSM



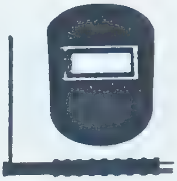
SABS
1978



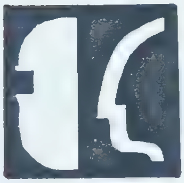
T&B
1984



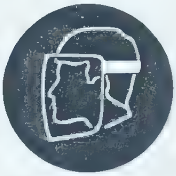
LSS
1984



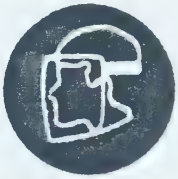
WCB



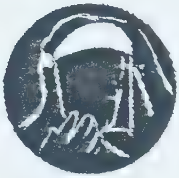
PS



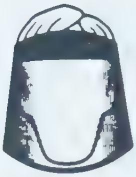
BS
1982



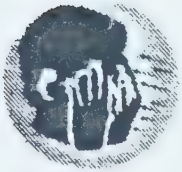
Focal
1984



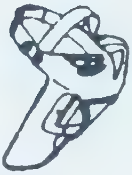
LSS
1984



FFA



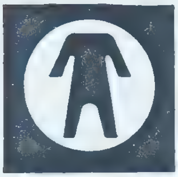
LSS
1984



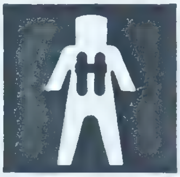
SEMEX

Protection

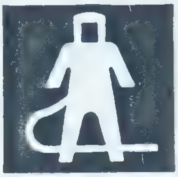
**Protective clothing required** 208



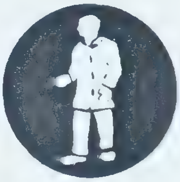
DSM



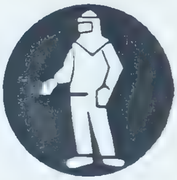
DSM



DSM

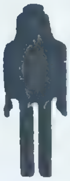


SSI

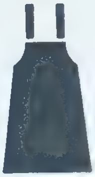


USArmy

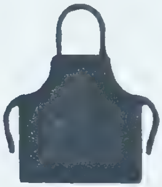
Dreyfuss



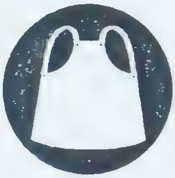
T&B
1984



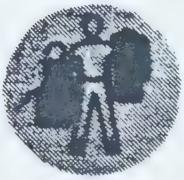
TFSP



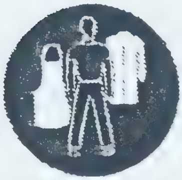
T&B
1984



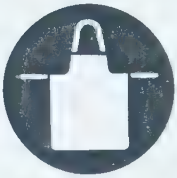
SABS
1978



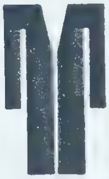
LSS
1984



LSS
1984



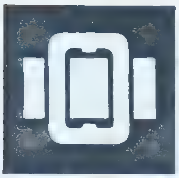
Brady
1978



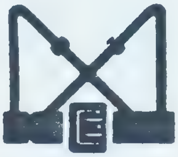
Dreyfuss

Protection

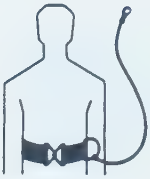
## **Protective belt/harness required** 209



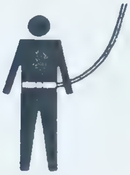
DSM



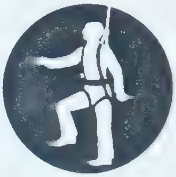
Dreyfuss



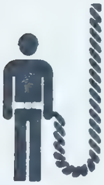
FFA



WCB



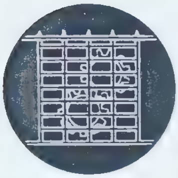
BS
1982



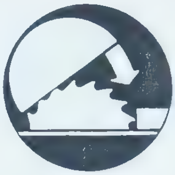
TFSP

Protection

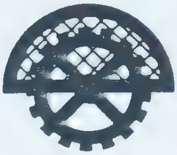
## **Use guard/ adjustable guard** 210



BS
1982



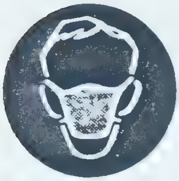
BS
1982

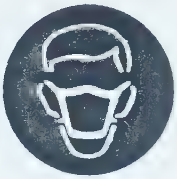


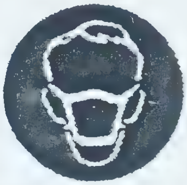
WCB

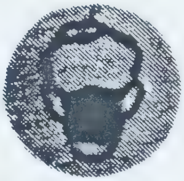
Protection

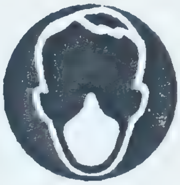
**Dust mask** 211

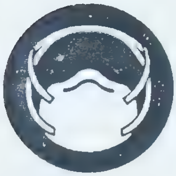

USDC

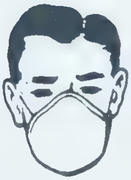



LSS
1984


LSS
1984

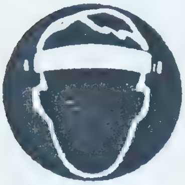

Focal
1984


SABS
1978


LSL

Protection

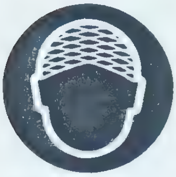
## **Wear visor** 212



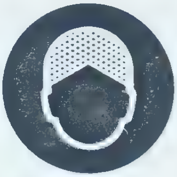
Focal
1984

Protection

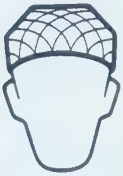
**Wear hairnets** 213



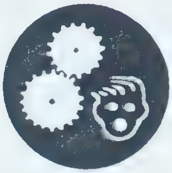
Brady
1978



SSC
1976



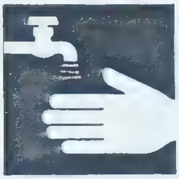
FFA



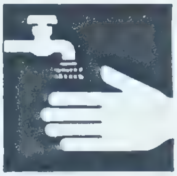
BS
1982

Protection

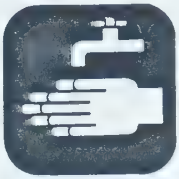
## **Wash hands** 214



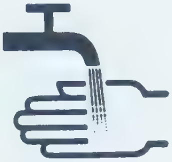
TFSP



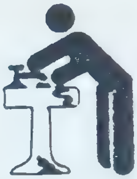
Mod/X'70



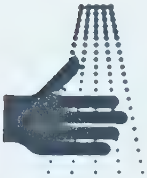
AC



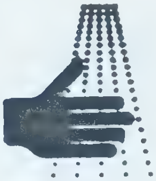
Mod



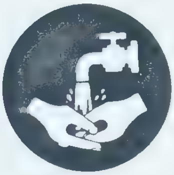
Best



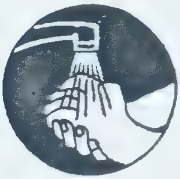
Mod/O'72



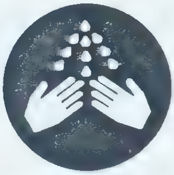
ERCO



BS
1980

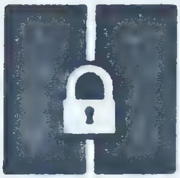


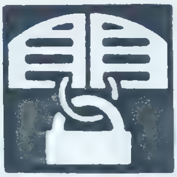
LSS
1984

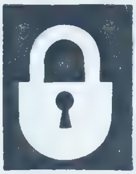


Brady
1978

## Protection
## **Keep locked** 215


Eas/ICOG
1979


Eas/ICOG
1979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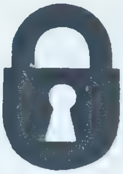
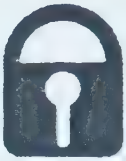

Eas/ICOG
1979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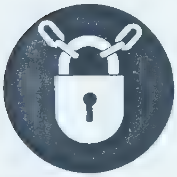
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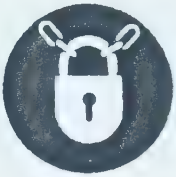
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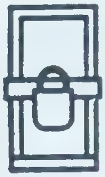
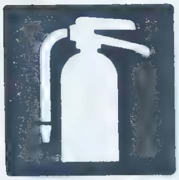

Eas/ICOG
1979

## Fire Safety
## **Fire extinguisher** 301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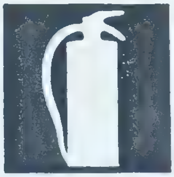
1978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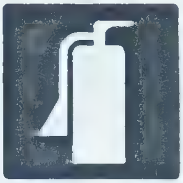
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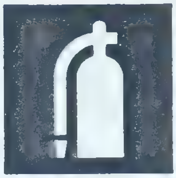
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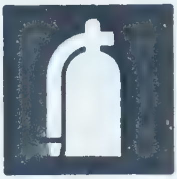
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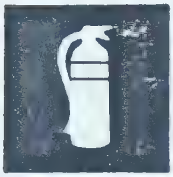
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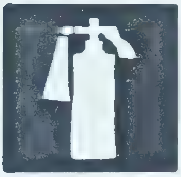
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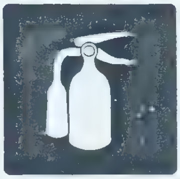
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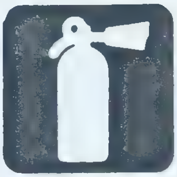
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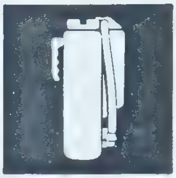
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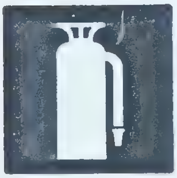
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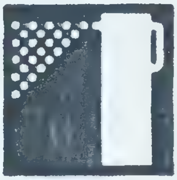
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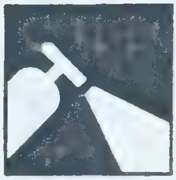
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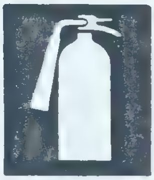
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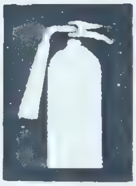
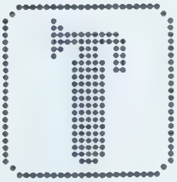

LSS
1984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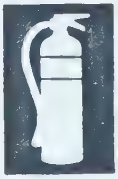
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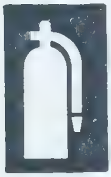
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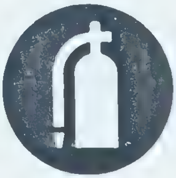
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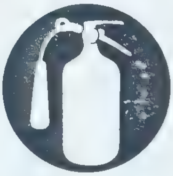
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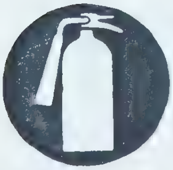
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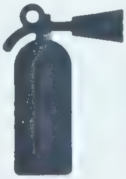
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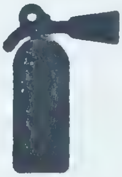
1981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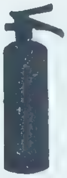
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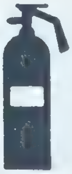
1984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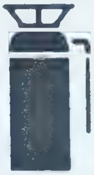
Fire Safety

**Fire extinguisher** 301

Dreyfuss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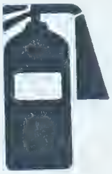
1983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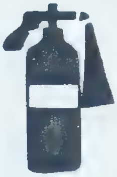
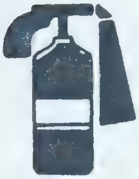

SSI

Best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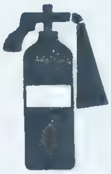
1984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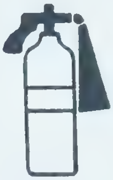
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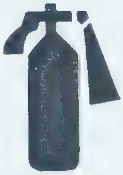
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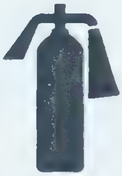
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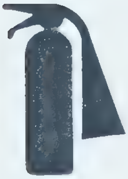
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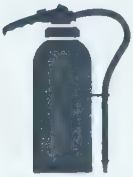
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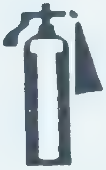
1978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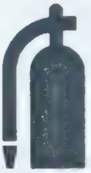
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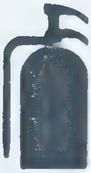
1984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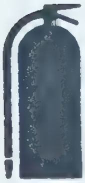
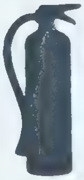
1984


LSS
1984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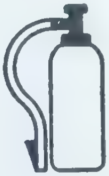
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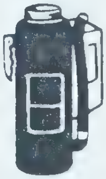
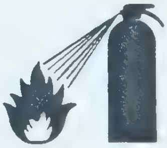

LSL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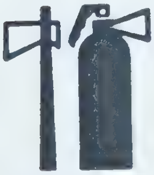
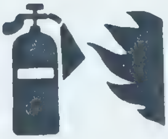
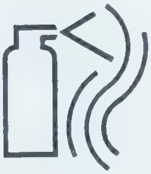

Eas/ICOG
1979


Eas/ICOG
1979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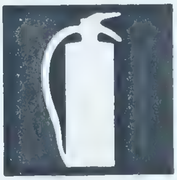
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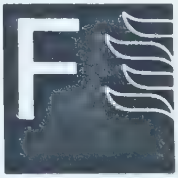
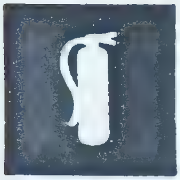


O'76

## Fire Safety

## **Fire extinguisher** 301



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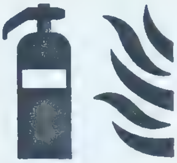
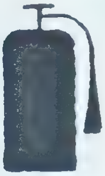


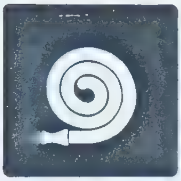
ISO
1984

DSC



Lom

Fire Safety
**Fire hose and reel** 302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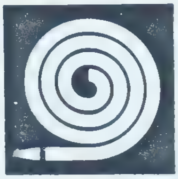
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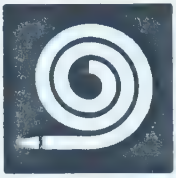
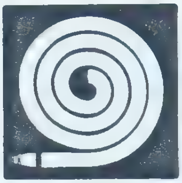

SSC
1976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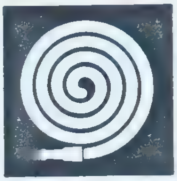
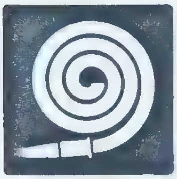
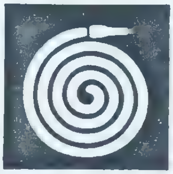

LSL


Brady
1978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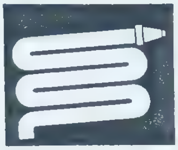
1984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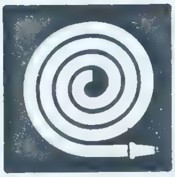
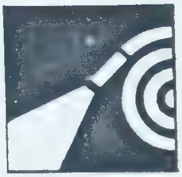

FIP
1980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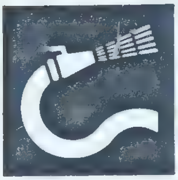
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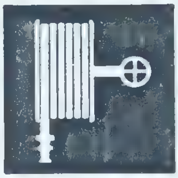
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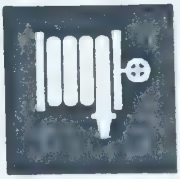
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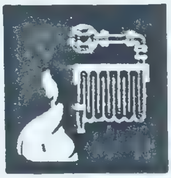
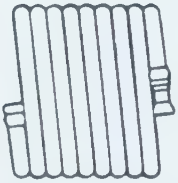
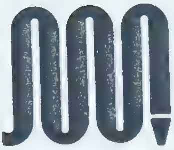
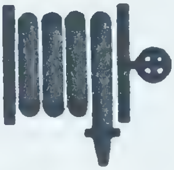
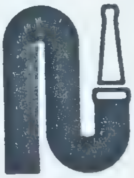
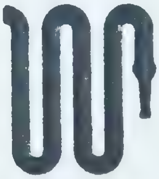

LSS
1984

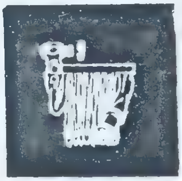

LSL

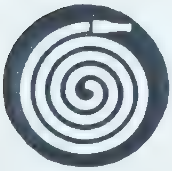

WCMHSC
1984

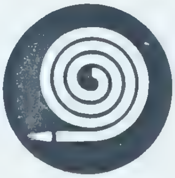

SS

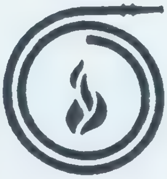

T&B
1984


Best


SEMEX


Eas/SELLO


Un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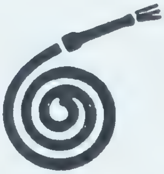
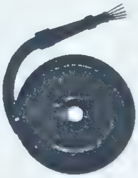
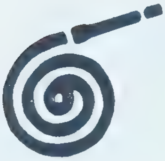

Dreyfuss

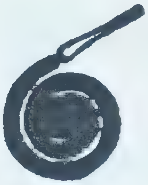

WCB

Fire Safety

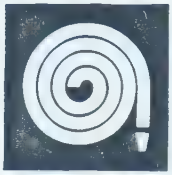
## **Fire hose and reel** 302



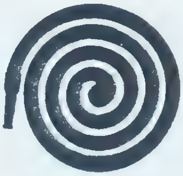
Stone



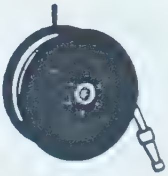
DSC



Picto



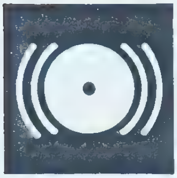
SABS
1978



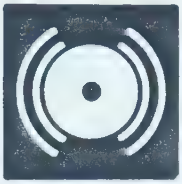
HIFPS

Fire Safety

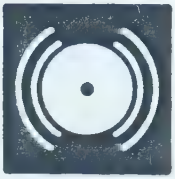
## **Fire alarm** 303



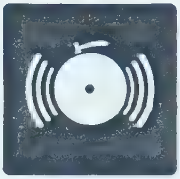
Pg



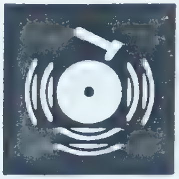
PSS



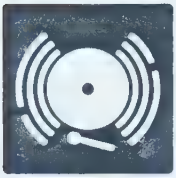
SSC
1976



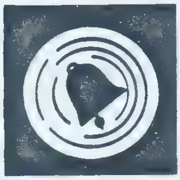
ADI



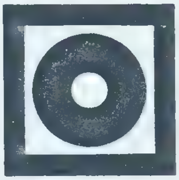
USDC



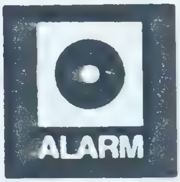
Brady
1984



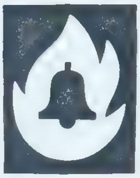
USDC



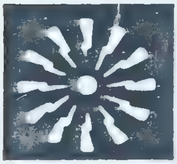
Collins



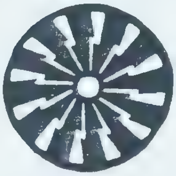
T&B
1984



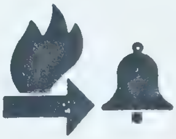
Picto



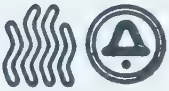
SLL
1984



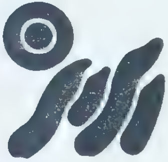
Eas/ICOG
1979



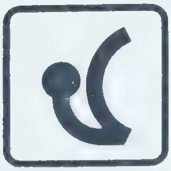
Eas/ICOG
1979



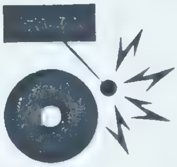
Eas/ICOG
1979



Eas/ICOG
1979

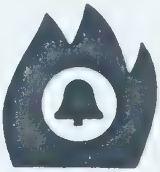


Grange

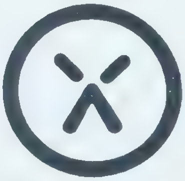


SABS
1978

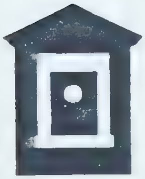
Dreyfuss



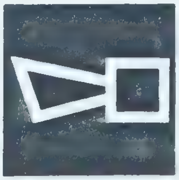
Eas/ICOG
1979



SK



Un

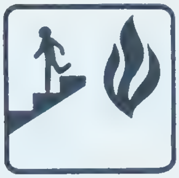


Collins

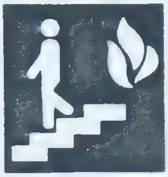
Lom

Fire Safety

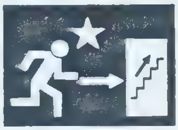
## Use stairs in case of fire, not lift 304



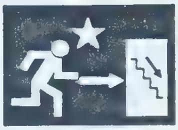
USDC



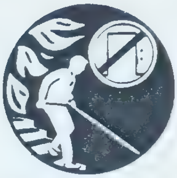
LSS
1984



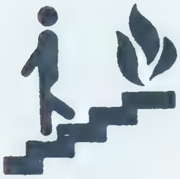
FFA



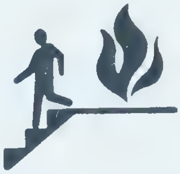
FFA



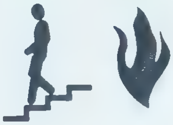
USDC



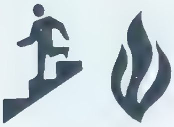
LSS
1984



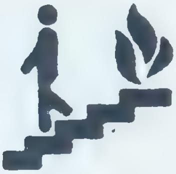
SSC
1984



NM



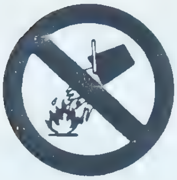
PSS

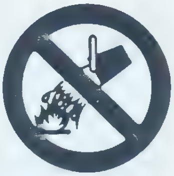


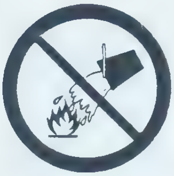
DSC

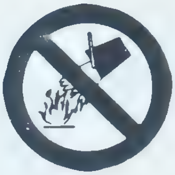
## Fire Safety

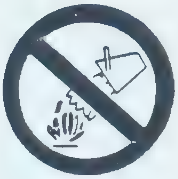
## **Do not use water to extinguish** 305

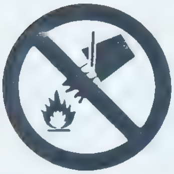

Dreyfuss

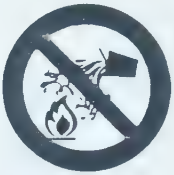

NBN
1983

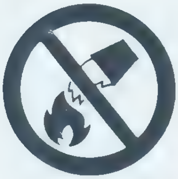

DS
1981

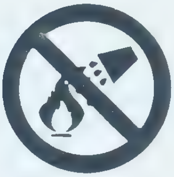

Collins

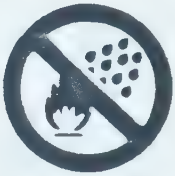

USArmy

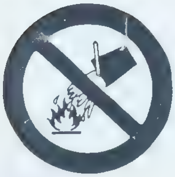

BS
1980

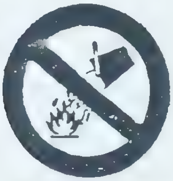

SABS
1978

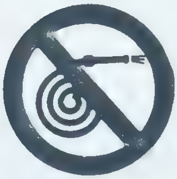

Picto


Brady
1978


SS

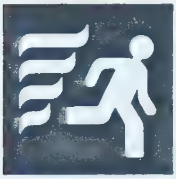

ISO
1984

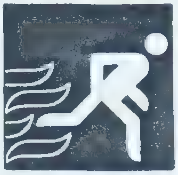

UNI

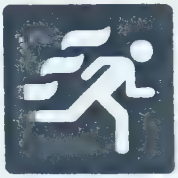

Dreyfuss

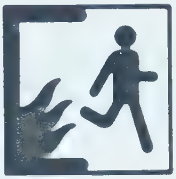
Fire Safety

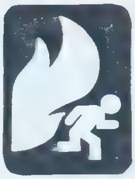
## **Emergency exit** 306

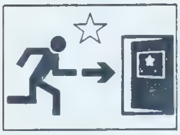

Gyllan

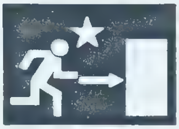

ERCO

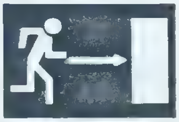

SBB

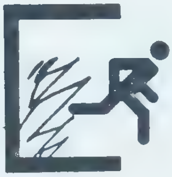

Kapitzki

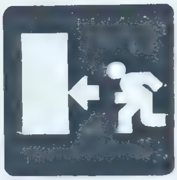

Picto

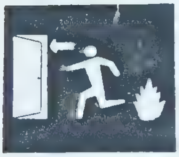

FFA

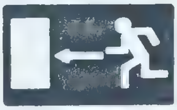

FFA

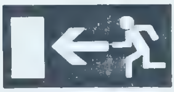

NBN
1983

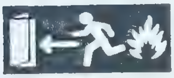

Eas/ICOG
1979

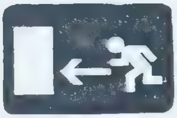

CESSS

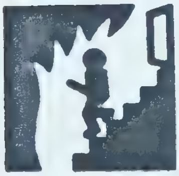

WCB

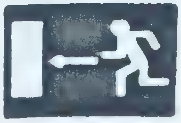

Dreyfuss


SSC
1984


BS
1982


Picto


Eas/ICOG
1979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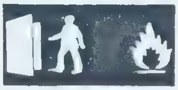
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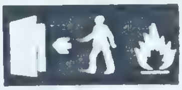
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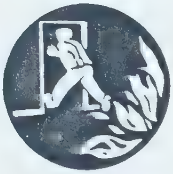
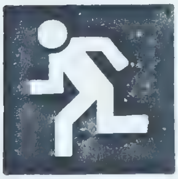
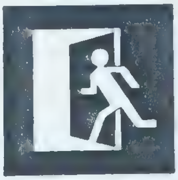
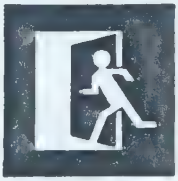
1984


USDC


SABS
1978


Collins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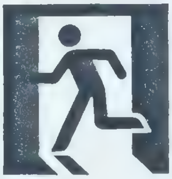
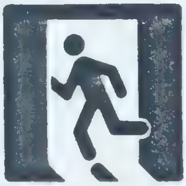
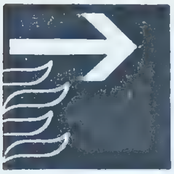

EES
1981


SS

Fire Safety
**Emergency exit** 306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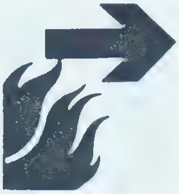
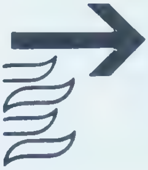
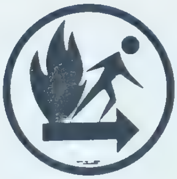
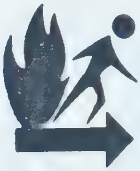

Brady
1984


Mod/O'72


USDC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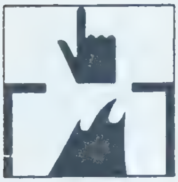
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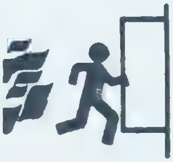
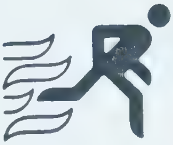
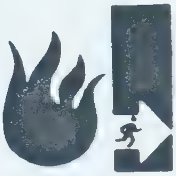
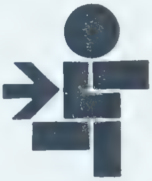
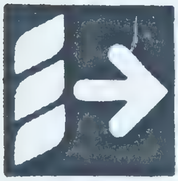
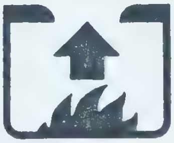

Eas/ICOG
1979

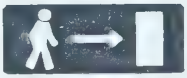

Mod/O'72


Eas/ICOG
1979


Ur/FUB


Anikst


Eas/ICOG
1979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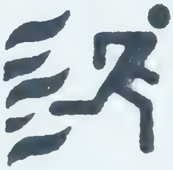
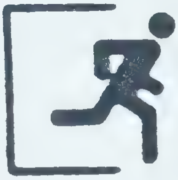
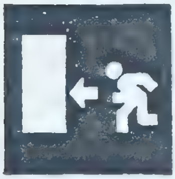
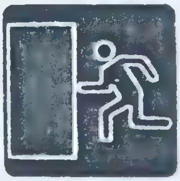
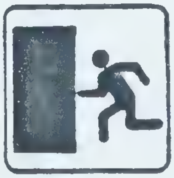
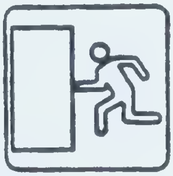

Lom

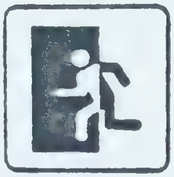

Lom


UNI


USDC

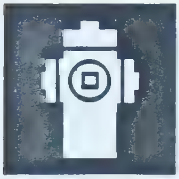

USDC


USDC

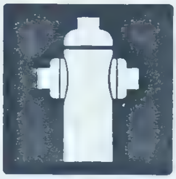

USDC

Fire Safety

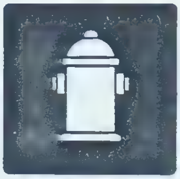
## **Fire hydrant** 307



Pg



Brady
1978



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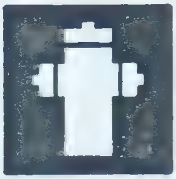
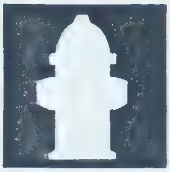
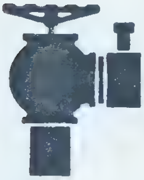


SSC
1976

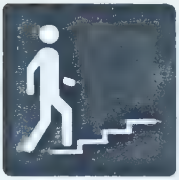


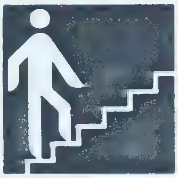
NFPA

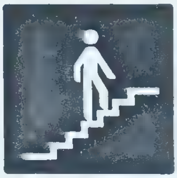


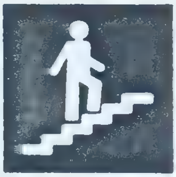
SABS
1978

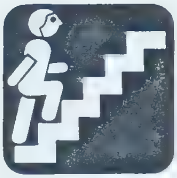
## Fire Safety
## **Stairs up** 308

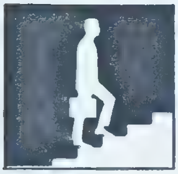

SBB

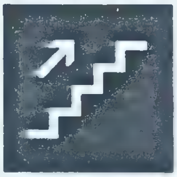

O'76

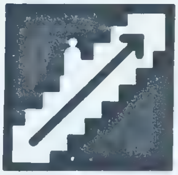

FIP
1983

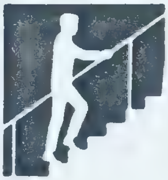

Pg

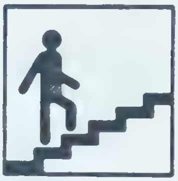

Ur/CHBA

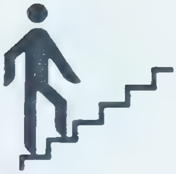

AIGA/MM
1969

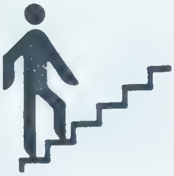

Mod/KFAI

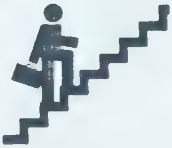

Mod/X'70

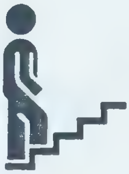

Best

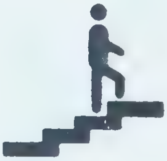

Kapitzki

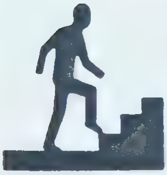

ERCO

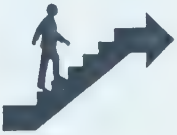

Mod/O'72

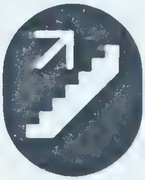

Mod/TC

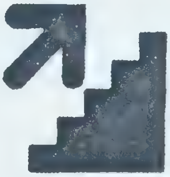

HH

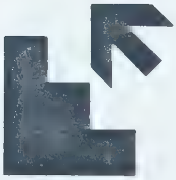

SS

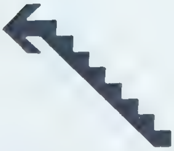

SaSo

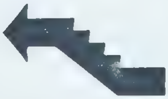

Dreyfuss

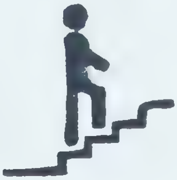

AIGA/CSS


Anikst


Ur/FUB


Mod/D/FW


Mod/UIC


Lom

Fire Safety

**Stairs down** 309

309.1

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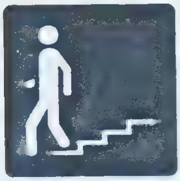
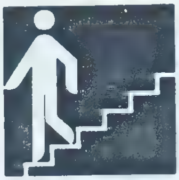
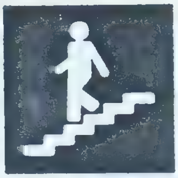
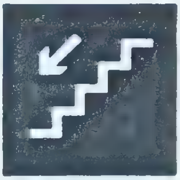
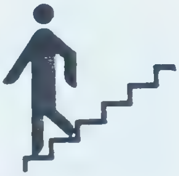
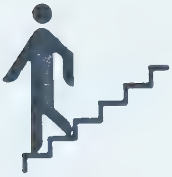

SBB

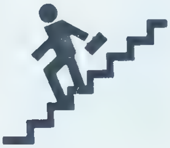

O'76

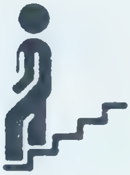

Pg

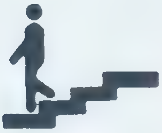

Mod/KFAI


ERCO


Mod/O'72


Mod/TC


HH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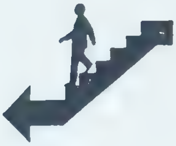
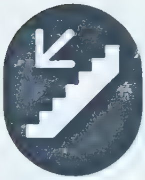
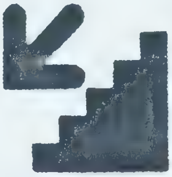
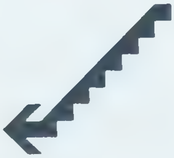
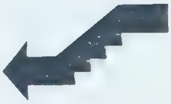

Dreyfuss


AIGA/CSS


Anikst


Mod/D/FW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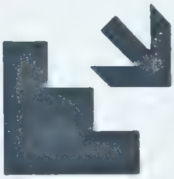
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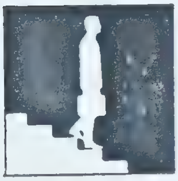
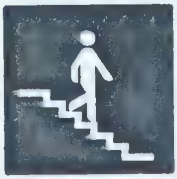

AIGA/MM
1969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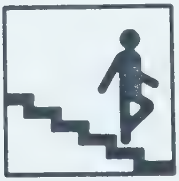
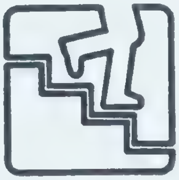
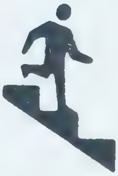
1983


Kapitzki


RH
1973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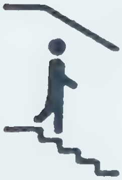
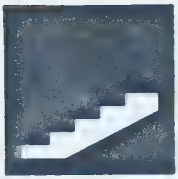
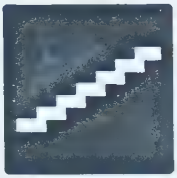
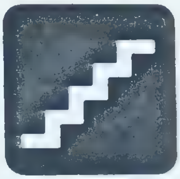
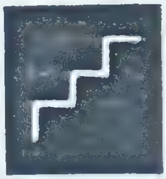

Lom

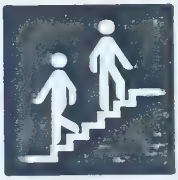
## Fire Safety
## **Stairs** 310

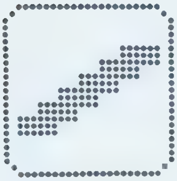

Pg

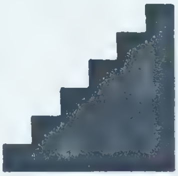

Brady
1978


KPIE
1981

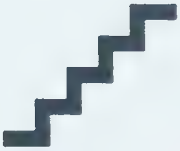

SLL
1984

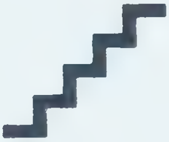

FIP
1983

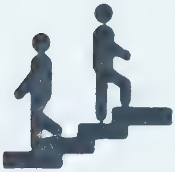

WC'78

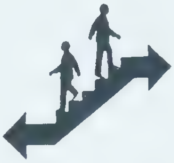

Un

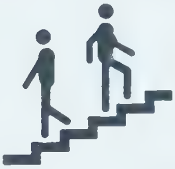
Picto


USDT
1981


Signcal
1983


SS

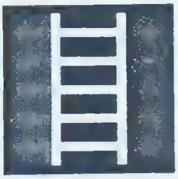

Dreyfuss


ÖNORM

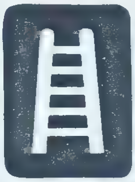
Ur/FUB

Fire Safety

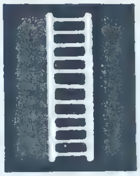
## **Ladder** 311



Collins

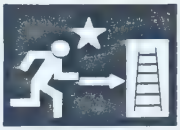


Picto



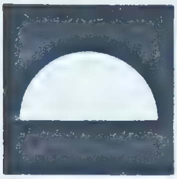
SLL
1984

SS



FFA

## Fire Safety
## **Fire protection equipment** 312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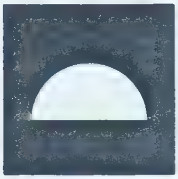
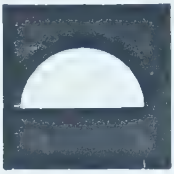

Collins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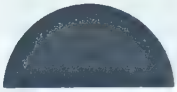
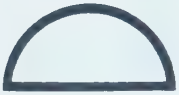

SIS
1967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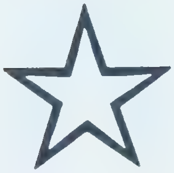
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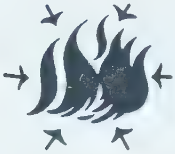
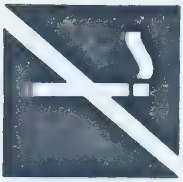
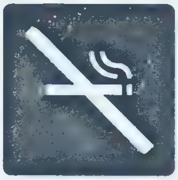
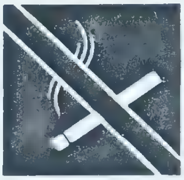
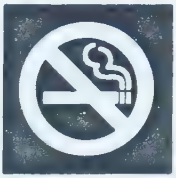

LSL

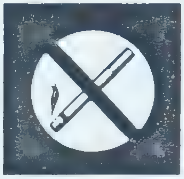
Prohibition
**No smoking** 401

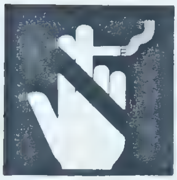

Mod/KFAI

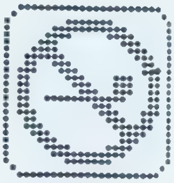

SBB

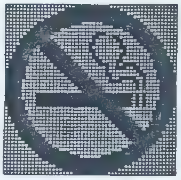

Mod/Port

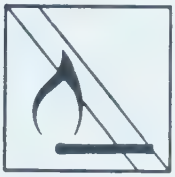

O’76

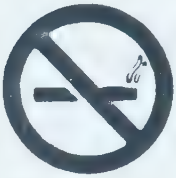

Mod/ICAO

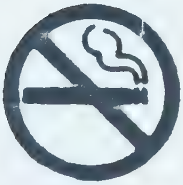

TFSP

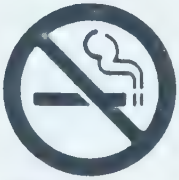

WC’78

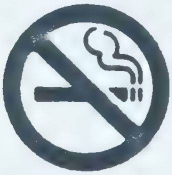

Mod/X’67

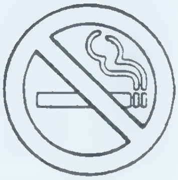

Mod/X’67

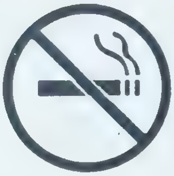

Best

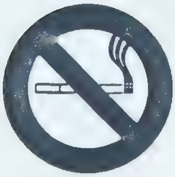

LSS
1984

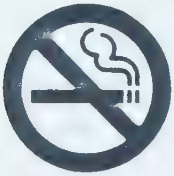

KPIE
1981

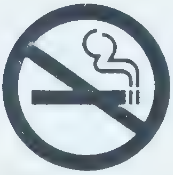

SS

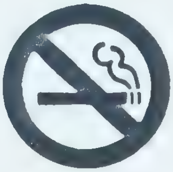

SaSo


NM


Ur


AIGA


PSS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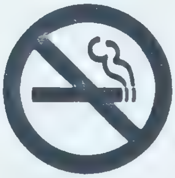
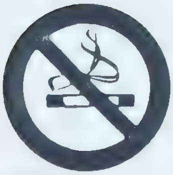
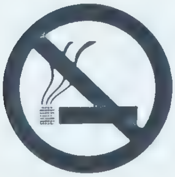
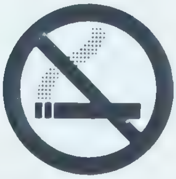
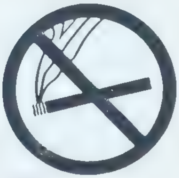
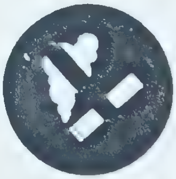

USDC


SABS
1978

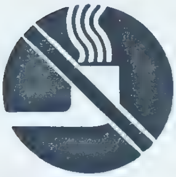

Brady
1978

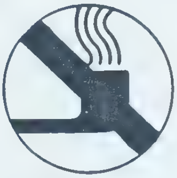

Picto

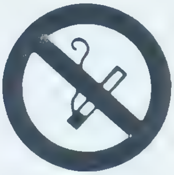

CSAO
1984

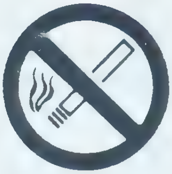

Mobil

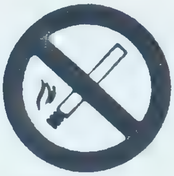
## Prohibition
## **No smoking** 401

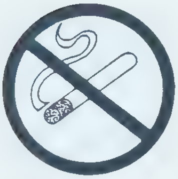

Mod/O'68

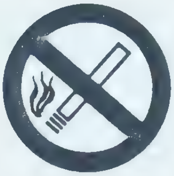

Dreyfuss


Mod/TC


SSI


SSI


Adkins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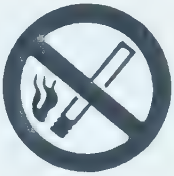
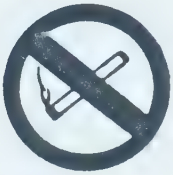
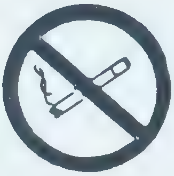
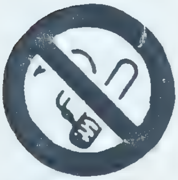
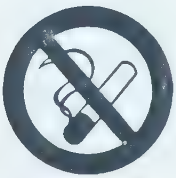
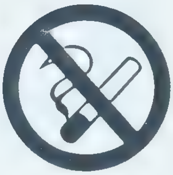

SaSo

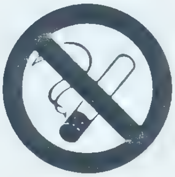

SaSo

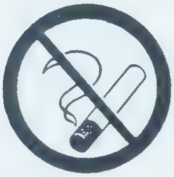

SaSo

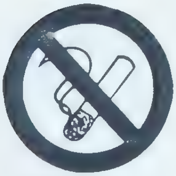

BS
1980

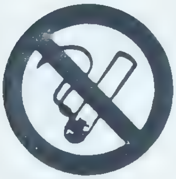

AS
1983


NBN
1983


NBN
1983


DS
1981


Collins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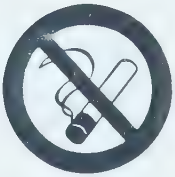
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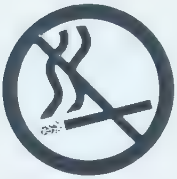
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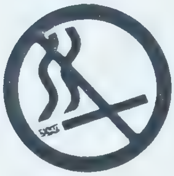
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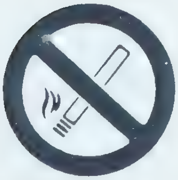
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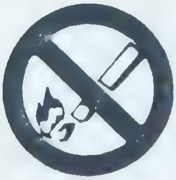
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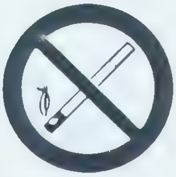
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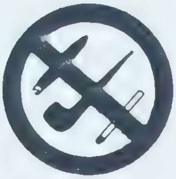
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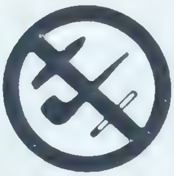
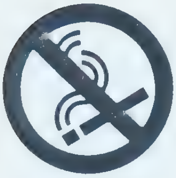

Mod/IATA

Prohibition

**No smoking** 401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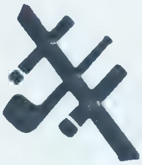
1984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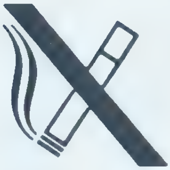
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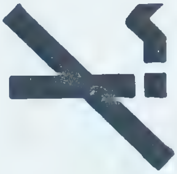
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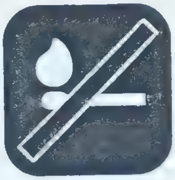
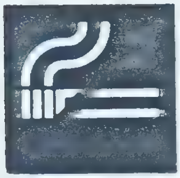

Mod/NPS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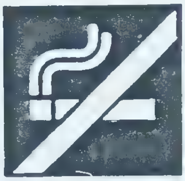
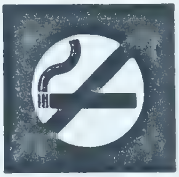

SE
1978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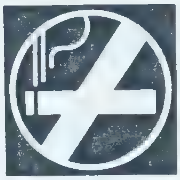
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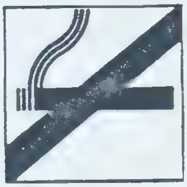
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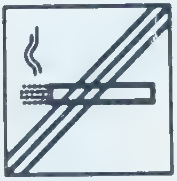
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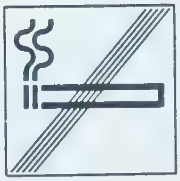
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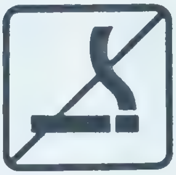
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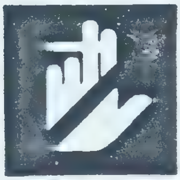
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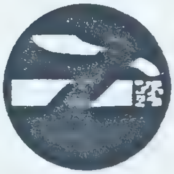
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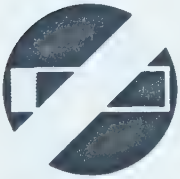
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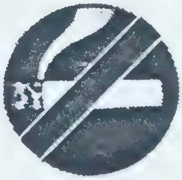
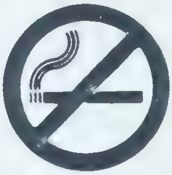

LSS
1984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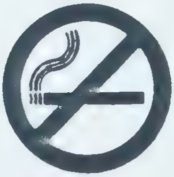
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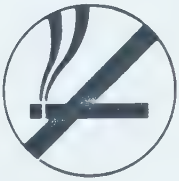
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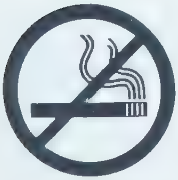
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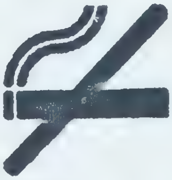
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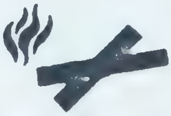
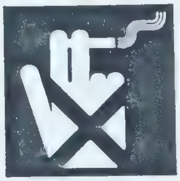

Brady
1978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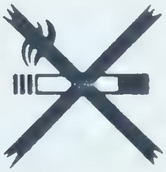
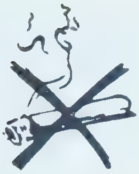

Mod/ADV

Prohibition
**No smoking** 401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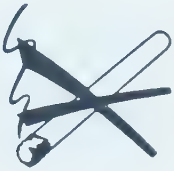
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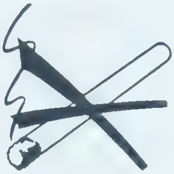
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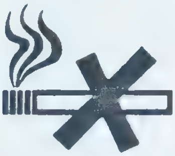
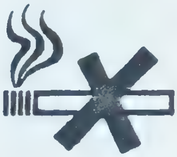

Dreyfuss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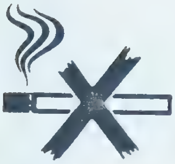
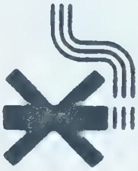

Mod/UIC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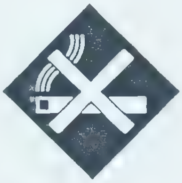
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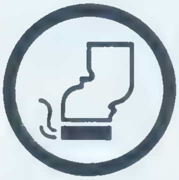
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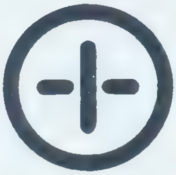
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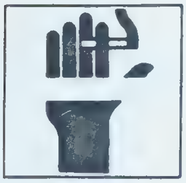
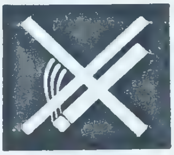

Mod/O'72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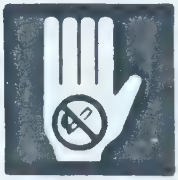
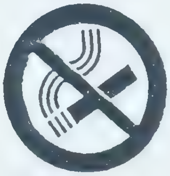

T&B
1984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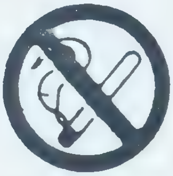
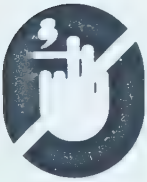
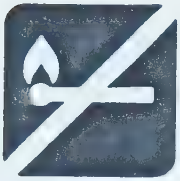

Focal
1984


CNSS

Prohibition

**No open flame** 402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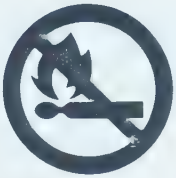
1980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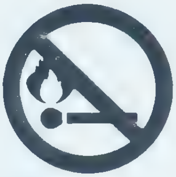
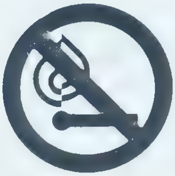

Brady
1978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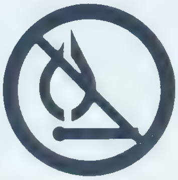
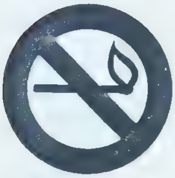
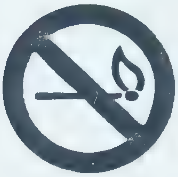
1984


LSL


O76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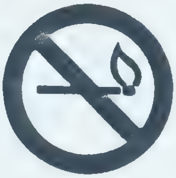
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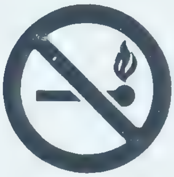
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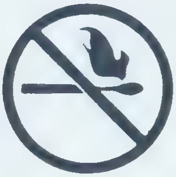
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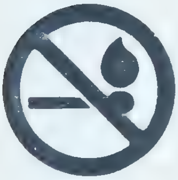
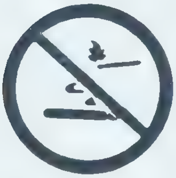

KPIE
1981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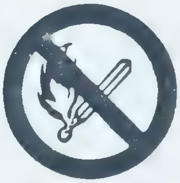
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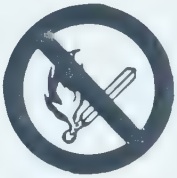
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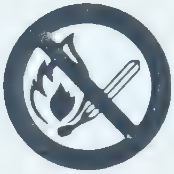
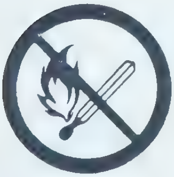

SABS
1978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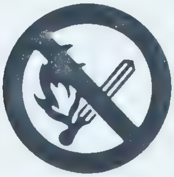
1981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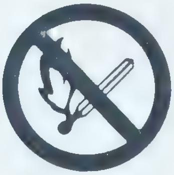
1983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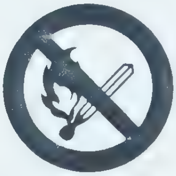
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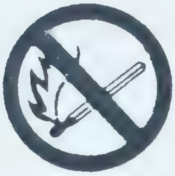
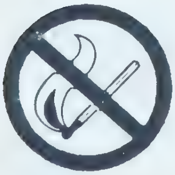

Focal
1984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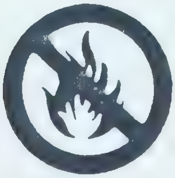
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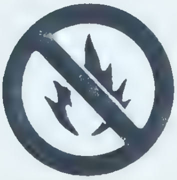
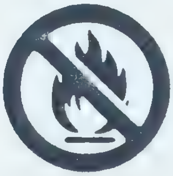

Stone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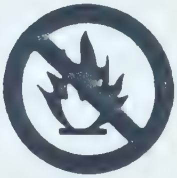
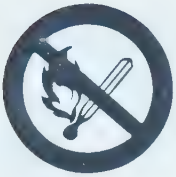
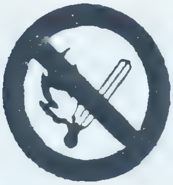

Un

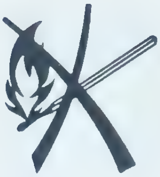
Prohibition
**No open flame** 402



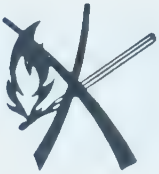
ISO
1984



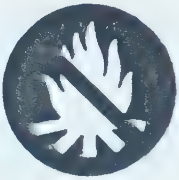
UNI



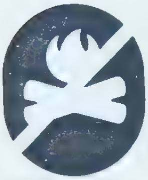
SIS
1967



FFA



Un



CNSS

Prohibition

**Do not enter/ no trespassing** 403

403.1

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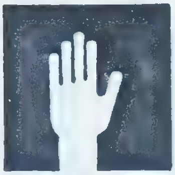
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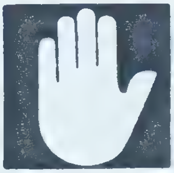
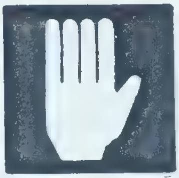
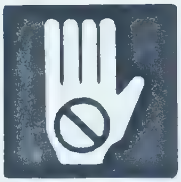
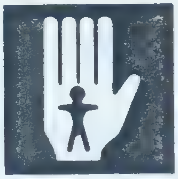
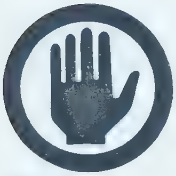
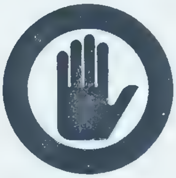

Eas/SFS
1979


T&B
1984


T&B
1984


T&B
1984


PSS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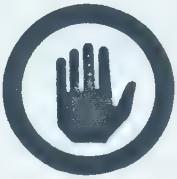
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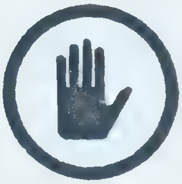
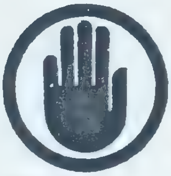
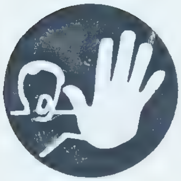
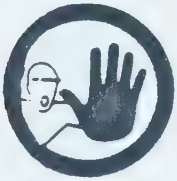
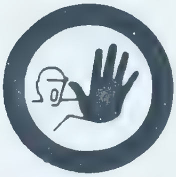
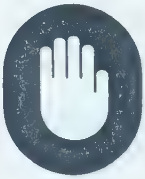

LSS
1984

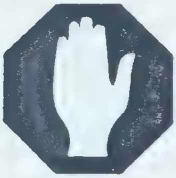

Mod/KFAI


USDC


Un


Eas/ISO
1975


CNSS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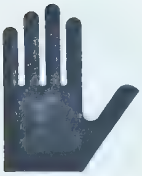
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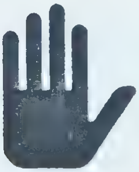
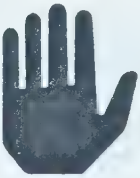
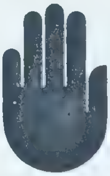
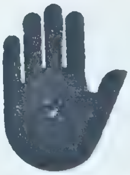
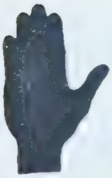
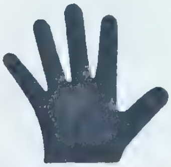

Eas/ICOG
1979

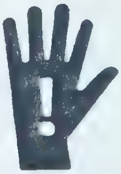

Dreyfuss

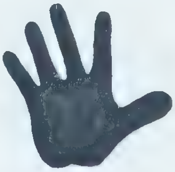

FFA

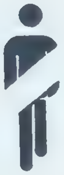

Un


Collins

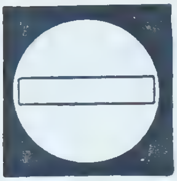

Eas/ISO
1975

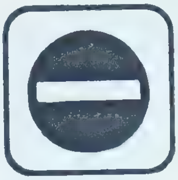

Dreyfuss

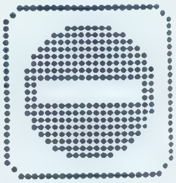

Eas/ICOG
1979

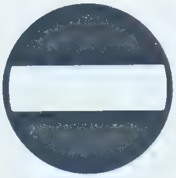

Un

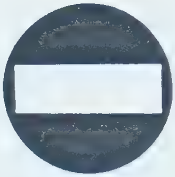
## Prohibition
## **Do not enter/no trespassing** 403

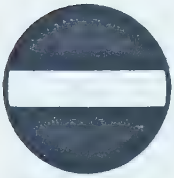

Mod/BAA

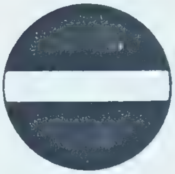

Mod/ADV

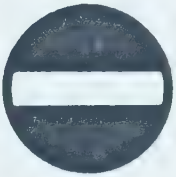

WC'78

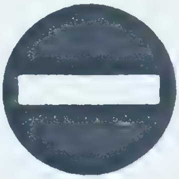

Ur/FUB

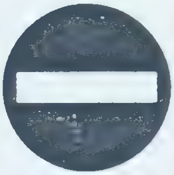

Mod/D/FW

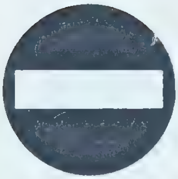

HS

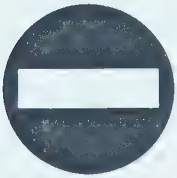

Mod/IATA

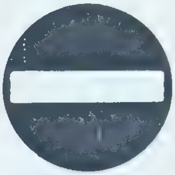

Best

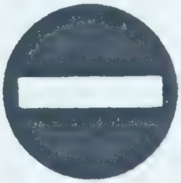

Eas/USDT
1979

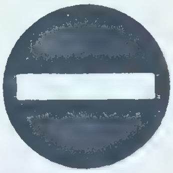

USDT
1981

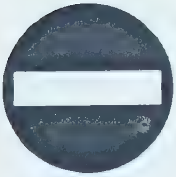

Mod/Pg

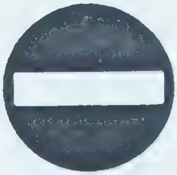

Picto

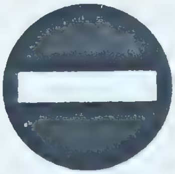

Mod/Port

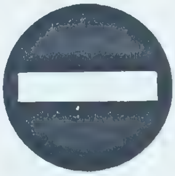

SS

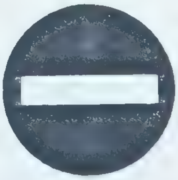

Eas/B&M
1979

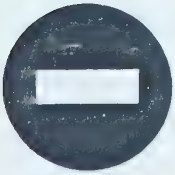

Mod/TA

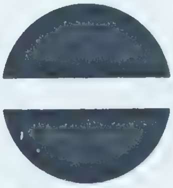

Eas/LT
1977

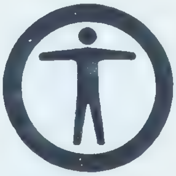

Eas/ICOG
1979

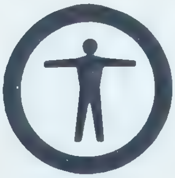

Eas/PTCNSW
1979

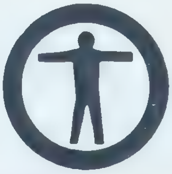

KPIE
1981


SABS
1978


Mod/BAA

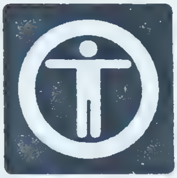

Mod/NRR

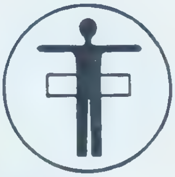

Mod/UIC

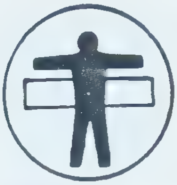

Dreyfuss

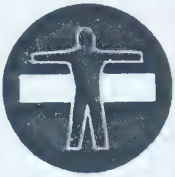
Prohibition

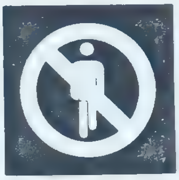
## Do not enter/no trespassing 403

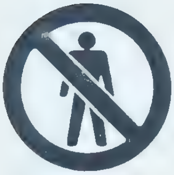

SBB

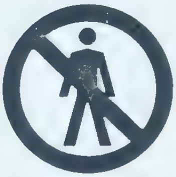

Mod/ADV

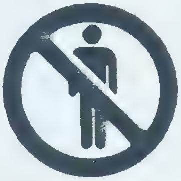

Dreyfuss

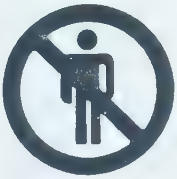

Mod/UIC

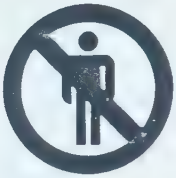

O'76

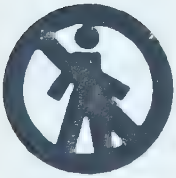

PSS

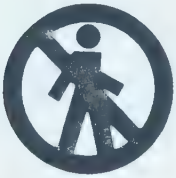

Brady
1984

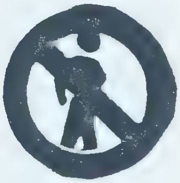

SS

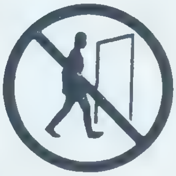

USDC

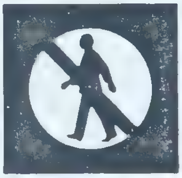

SSC
1984

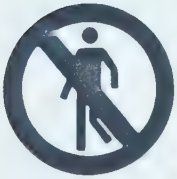

Eas/CT

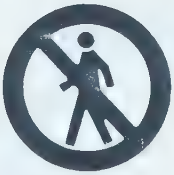

Mod/TC

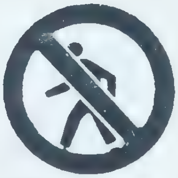

DSC

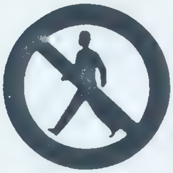

NM

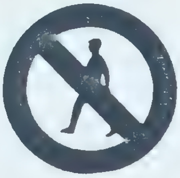

Mod/ICAO

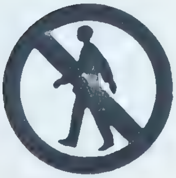

Dreyfuss

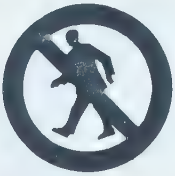

SABS
1978

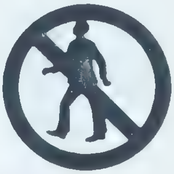

Stone

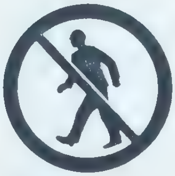

FFA

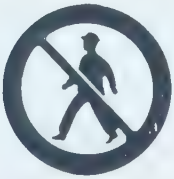

Eas/CSN
1966


SaSo


AS
1983

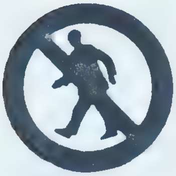

BS
1980


DS
1981

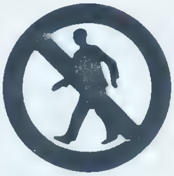

MSA

Prohibition

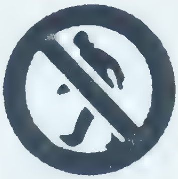
**Do not enter/ no trespassing** 403



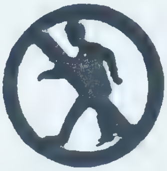
Eas/ISO
1975



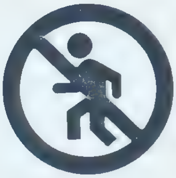
NBN
1983



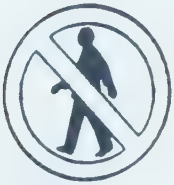
Un



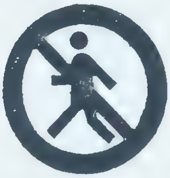
Focal
1984



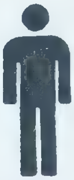
Picto



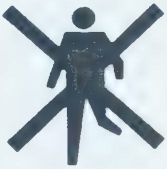
Dreyfuss



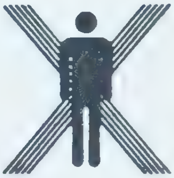
UNI



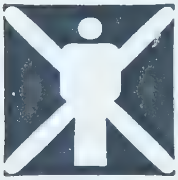
LSS
1984



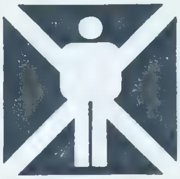
WCB



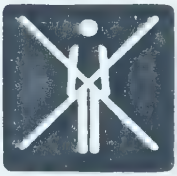
Eas/SIM
1979



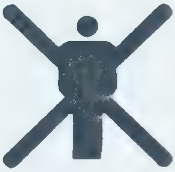
Mod/O'72



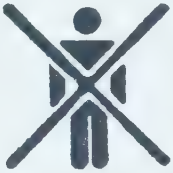
Mod/X'70



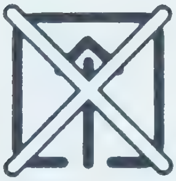
Eas/ENFI
1979



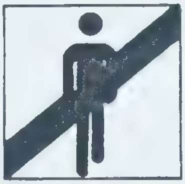
Mod/WO'72



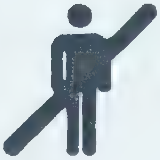
Lom



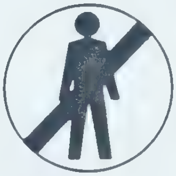
Eas/ICOG
1979



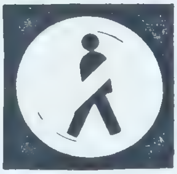
ERCO



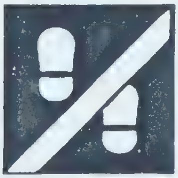
Anikst



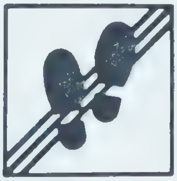
Mod/S/TA



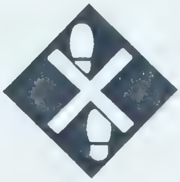
Mod/BAA



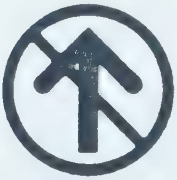
SS



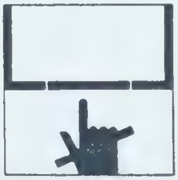
Kapitzki



EXPO'75



Eas/ICOG
1979

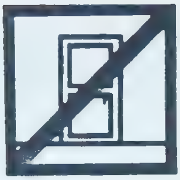


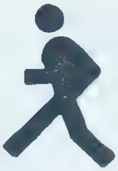
Aureli

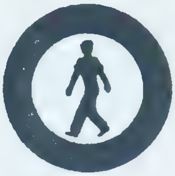
Prohibition

## Do not enter/no trespassing 403

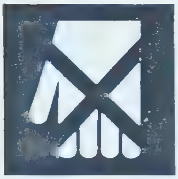
403.5


Eas/ICOG
1979

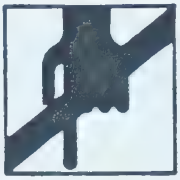

Eas/ISO
1975


SEMEX

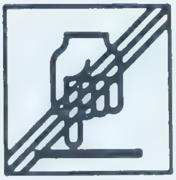
## Prohibition
## **Do not touch** 404



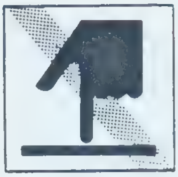
Mod/X'70



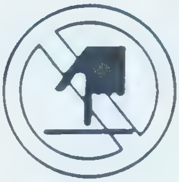
ERCO



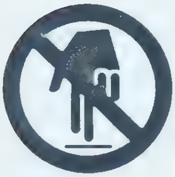
Kapitzki



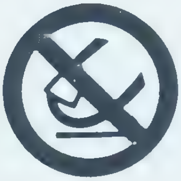
Mod/X'67



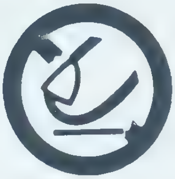
Collins



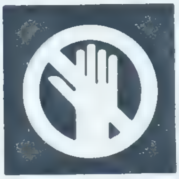
Brady
1978



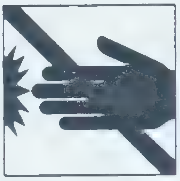
SCC



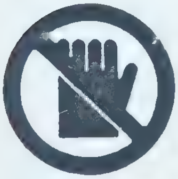
Collins



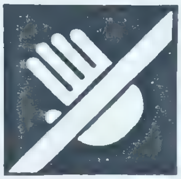
O'76



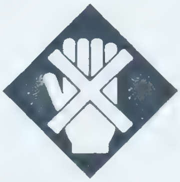
TFSP



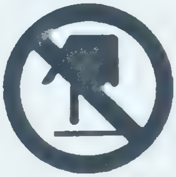
KPIE
1981



SS



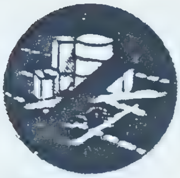
EXPO'75



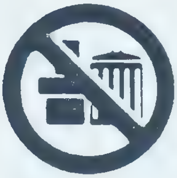
SSC
1976

Prohibition

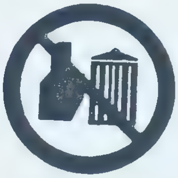
## **Do not block** 405



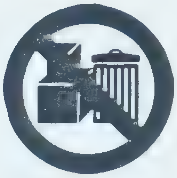
LSS
1984



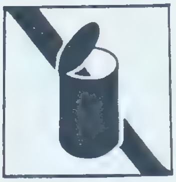
SS



FFA

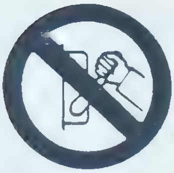


USDC

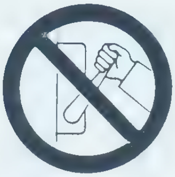


Mod/X'67

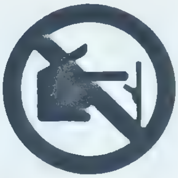
## Prohibition
## **Do not operate** 406



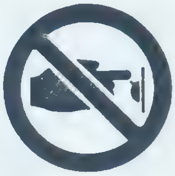
SLL
1984



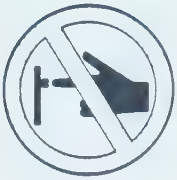
BS
1982



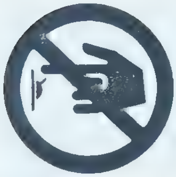
SSC
1976



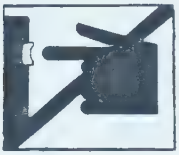
PSS



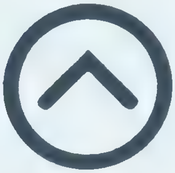
Dreyfuss



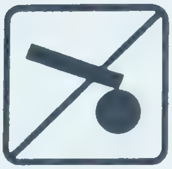
Brady
1978



WCB

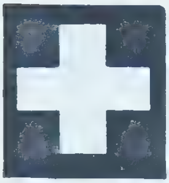


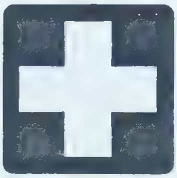
SK

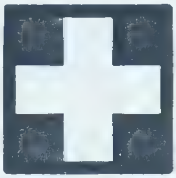


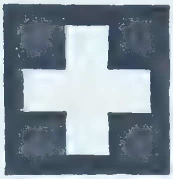
Grange

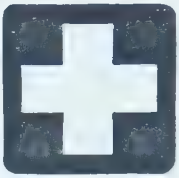
Information
**First aid** 501

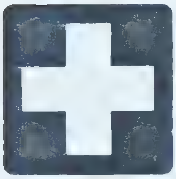

SCC


BS
1980


Brady
1978


UNI


ISO
1984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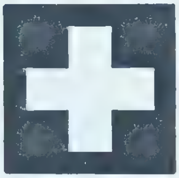
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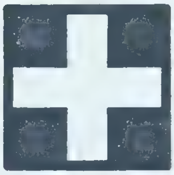
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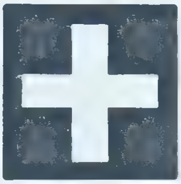
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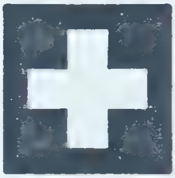
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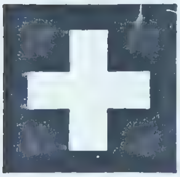
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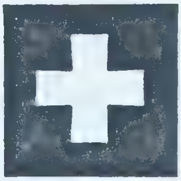
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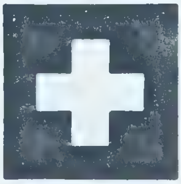
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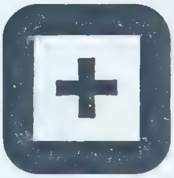
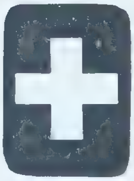

Mod/NPS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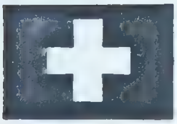
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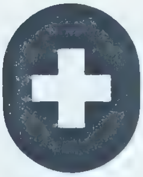
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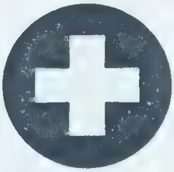
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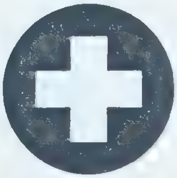
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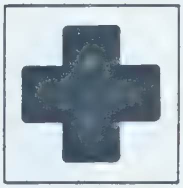
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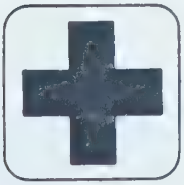
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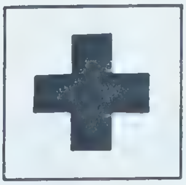
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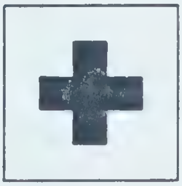
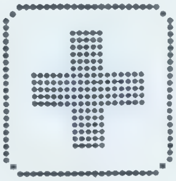
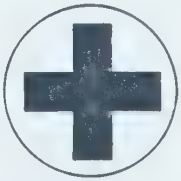

Mod/IATA


WC'78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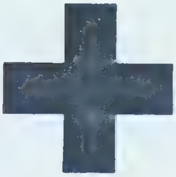
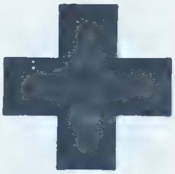


Pg



SIS
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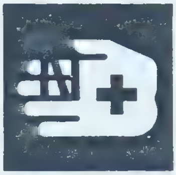

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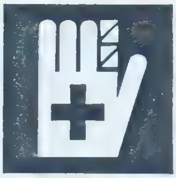
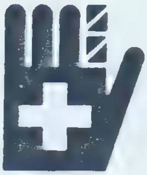
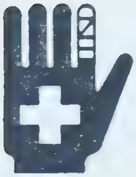


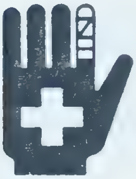
Mod/X’70



Mod/WO’72



Mod/BAA



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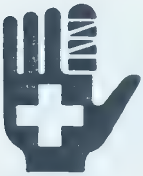
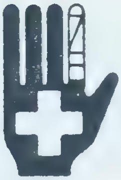


Mod/D/FW



T&B
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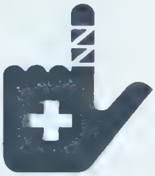

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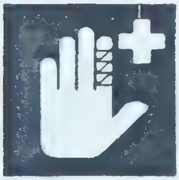

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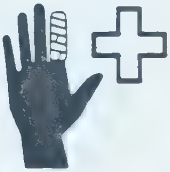
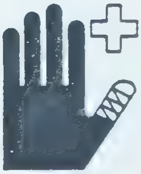
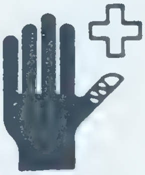


Mod/ICAO



Mod/TC



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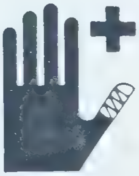
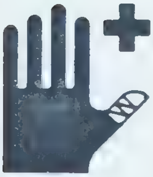
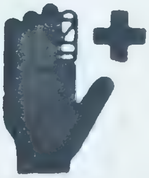


Mod/X’67



Mod/ADV



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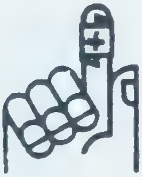

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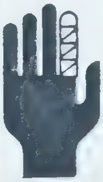
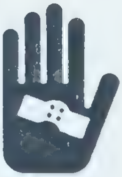


ERCO



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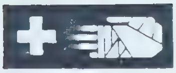

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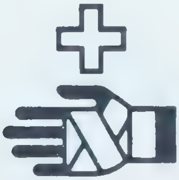
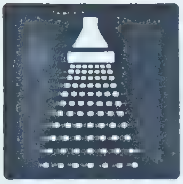


ÖNORM

Information

## Safety shower/shower 502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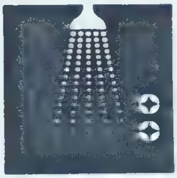
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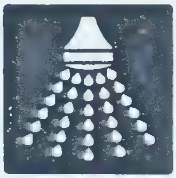
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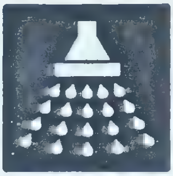
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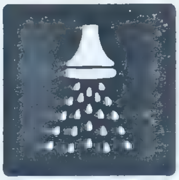
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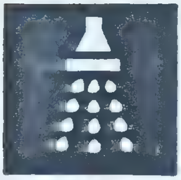
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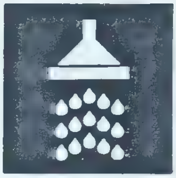
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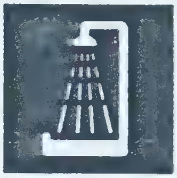
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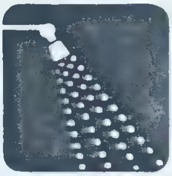
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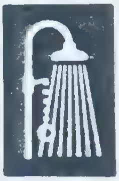
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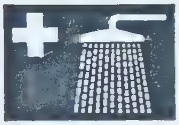
DS
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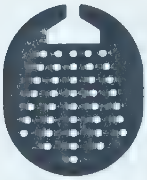
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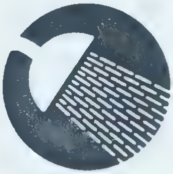
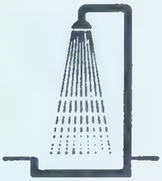

Mod/O'68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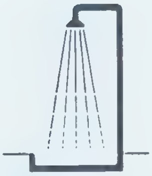
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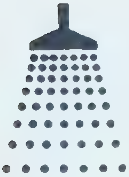
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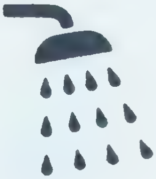
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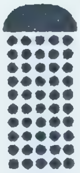
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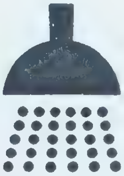
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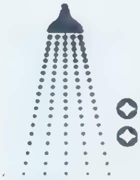
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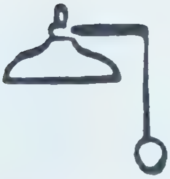
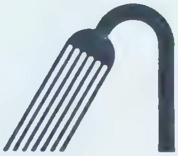

LSS
1984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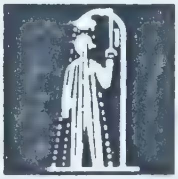
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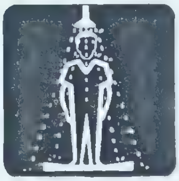
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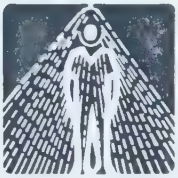
Un

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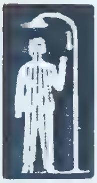
**Safety shower/ shower** 502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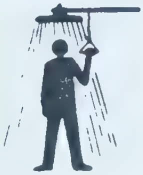
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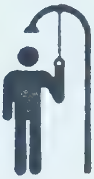
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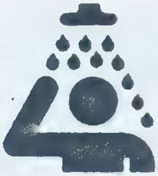
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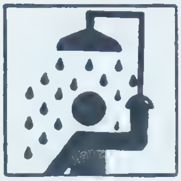
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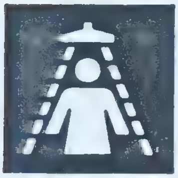
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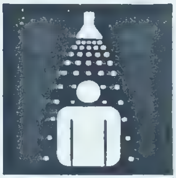
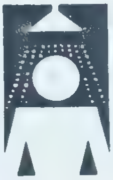
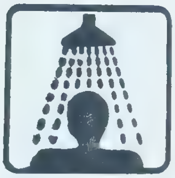
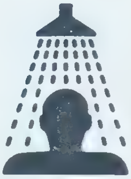
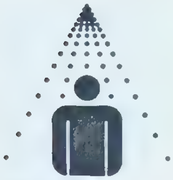
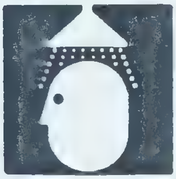

Mod/O'72

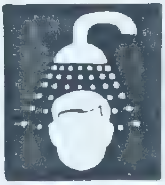

LSS
1984

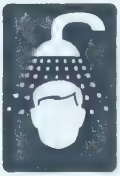

USDC

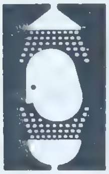

Un

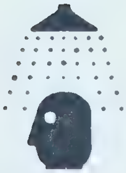

Mod/WO'72

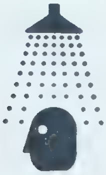

T&B
1984

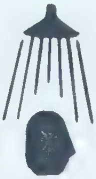

BS
1980

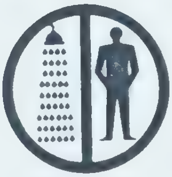

Un

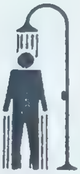

LSS
1984

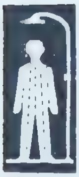

SSI

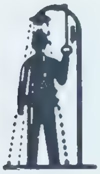

Mod/WO'72


Stone


Dreyfuss

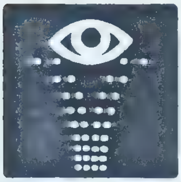

WCB

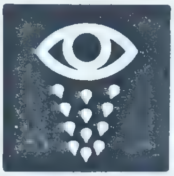

Focal
1984

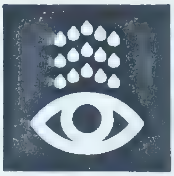

Un

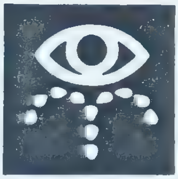
Information

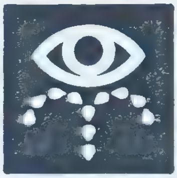
## **Eye wash** 503

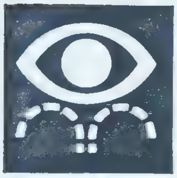

PSS

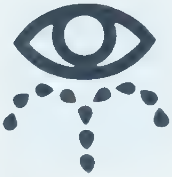

FIP
1983

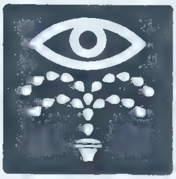

Pg

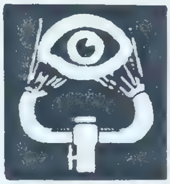

USDC

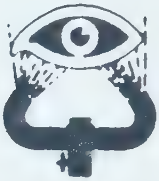

SSC
1984

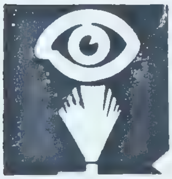

DSM

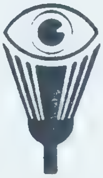

Un

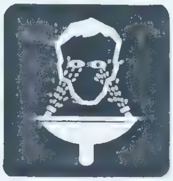

Brady
1978

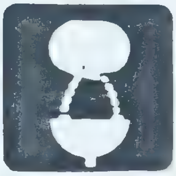

LSS
1984

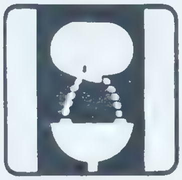

Best

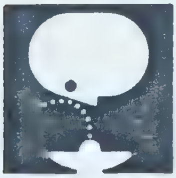

USDC

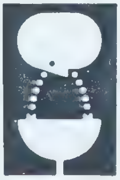

LSS
1984


AS
1983

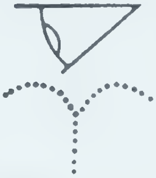

USDC

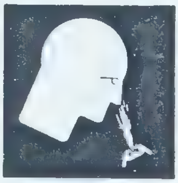

USDC

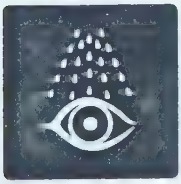

T&B
1984

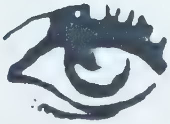

LSS
1984

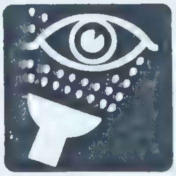
SS

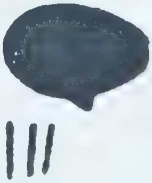

SSI


LSL

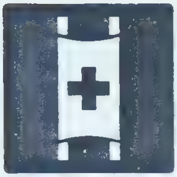

ADI

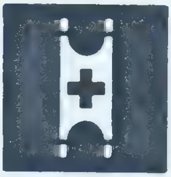

LSS
1984

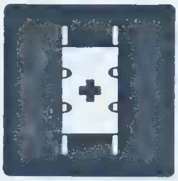

BS
1982

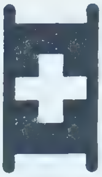

DSC

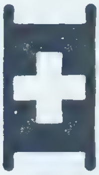
Information
## **Stretcher** 504

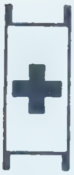

Brady
1978

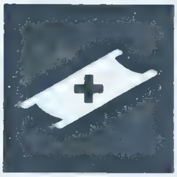

SSC
1984

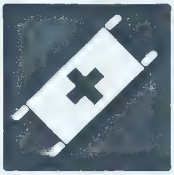

ADI

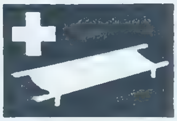

Dreyfuss


Mod/WO'72

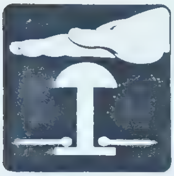

Mod/O'72

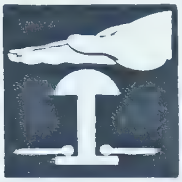

Pg

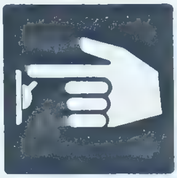

FIP
1983

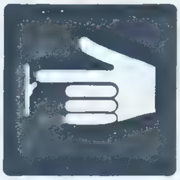

DS
1981

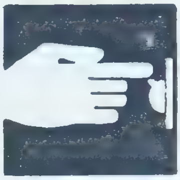
## Information
## **Emergency stop** 505

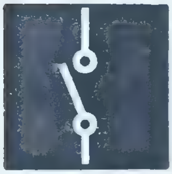

BS
1982


SLL
1984

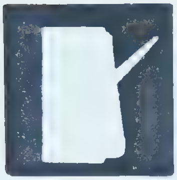

Brady
1978


ADI

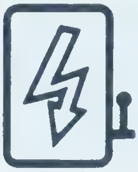

PSS


SABS
1978

Information
**Mainswitch** 506



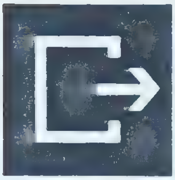
SLL
1984

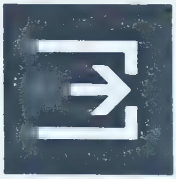


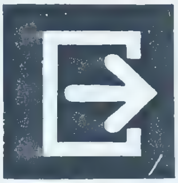
Dreyfuss

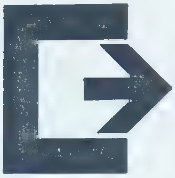
Information

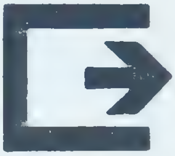
**Exit** 507

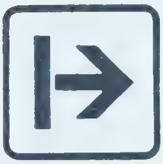

Mod/KFAI

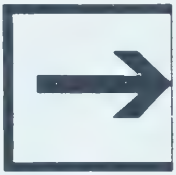

Mod/Pg

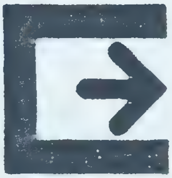

SE
1978

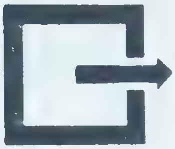

Ur/FUB

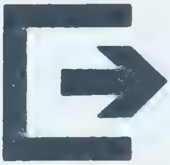

Eas/LT
1977

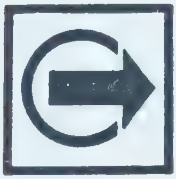

Grange

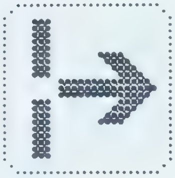

Mod/X'67

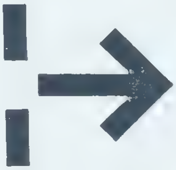

Anikst

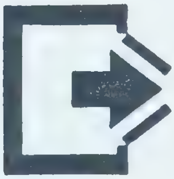

SABS
1978

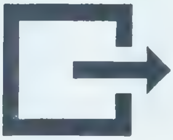

Eas/BR
1975/76

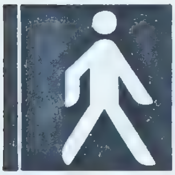

Eas/ICOG
1979

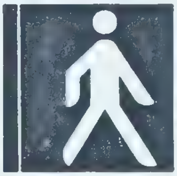

WC'78

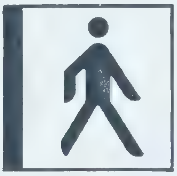

PrS


Eas/SIM
1979


Dreyfuss


Mod/X'70


O'76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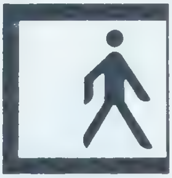
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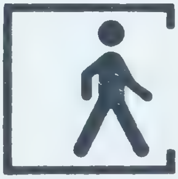
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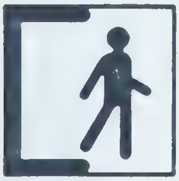
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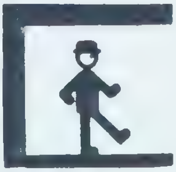
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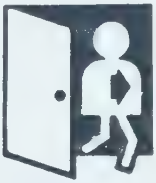
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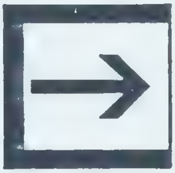
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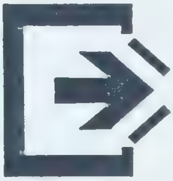
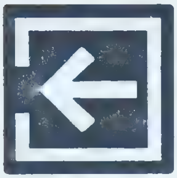

ISO
1984

## Information
## **Exit** 507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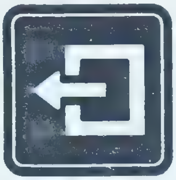
1984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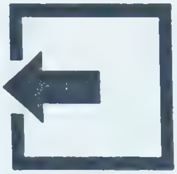
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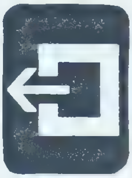
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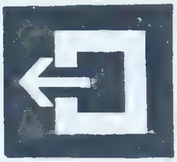
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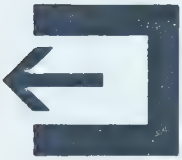
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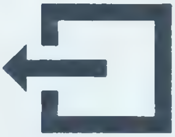
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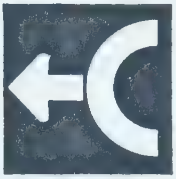
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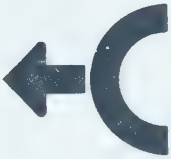
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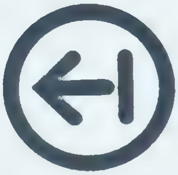
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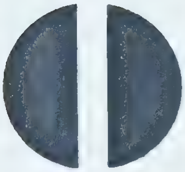
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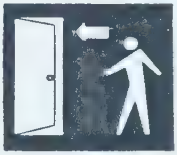
1979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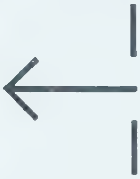
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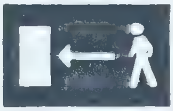
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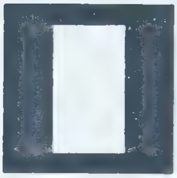
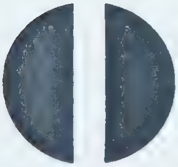

Collins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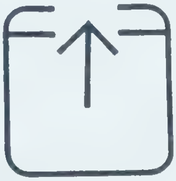
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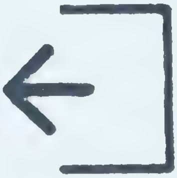
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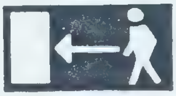
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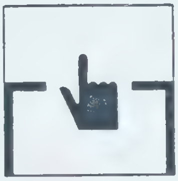
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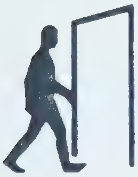
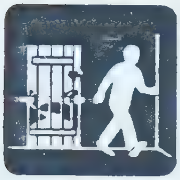

NM

Information

## **No exit/ door blocked** 508



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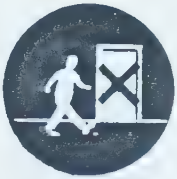

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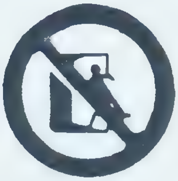

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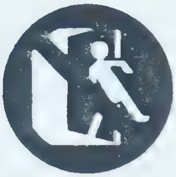

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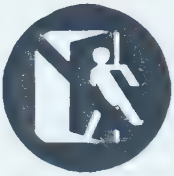

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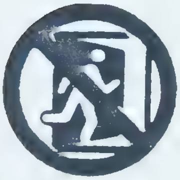

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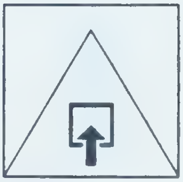
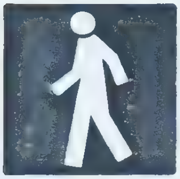


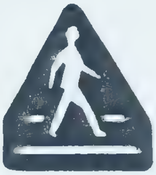
Collins

Information

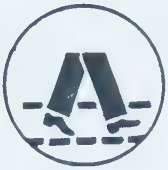
## **Pedestrian crossing** 509



SABS
1978



Dreyfuss



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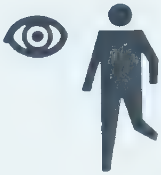

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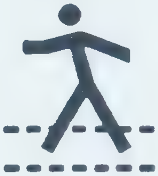

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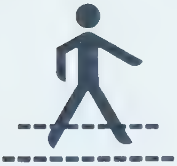

FIP
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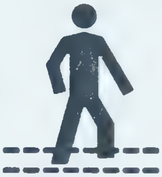
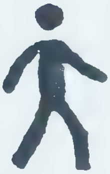


Brady
1978



SS

Attachment #1

# ISO Technical Report 7239

# Development and principles for application of public information symbols

# ISO Draft Technical Report 7239

Development and principles for application of public information symbols

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2. References
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Annex B. Structural elements of a sign
Annex C. Example of sign development

*Illustrations*

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## 0. Introduction

At its inaugural meeting in October 1975, ISO/TC145/SC1 resolved to develop a manual on criteria for the design and application of symbols for public information.

This draft Technical Report has been developed by ISO/TC145/SC1 following the publication in 1979 of ISO 7001 'Public Information Symbols'. It was originally intended that the topics discussed here would form part of that standard, but it was decided by TC145/SC1 that separate publication of the technical report was advisable in order to expedite publication of ISO 7001.

The technical contents of this Technical Report were agreed at the fourth meeting of TC145/SC1 in Balatonfüred in May 1981. Its content will be reviewed over the next three years with a view to its adoption as ISO 3461 : Part 4.

Since the subject of this Technical Report is still under development, constructive criticism on the topics outlined here and on their practical use with public information symbols are welcomed. Such comments, as well as any notification of any new research results pertinent to public information symbols will assist ISO/TC145/SC1 in reviewing the technical content of this Technical Report in three years time.

The development of symbols for public information requires the solution to two problems, firstly, the comprehension of the symbol in terms of the message it is intended to convey and secondly its conspicuity and legibility in terms of its size, detail, environment and position in relation to the viewer.

ISO 7001 consists of single sheets, each relating to one particular symbol. It contains an explanation of each symbol and its application, a verbal description of the image content and a guide-line example for the symbol. ISO 7001 standardizes the image content in terms of its verbal description; the pictorial guide-line examples are specimen designs which show how the image content may be presented graphically but are not intended to be binding (see Annex A).

This Technical Report is intended to assist the managers of organizations and their designers in the use of ISO 7001 and to provide an understanding of the intentions of ISO/TC145/SC1.

## 1. Scope and field of application

This Technical Report provides a set of recommended procedures to be followed and details the essential technical criteria which should be taken into account when developing or considering the use of graphic symbols as a means of visual pictorial communication. The field of applicability is mainly in those areas where the public have a right of access or some degree of access by licence, i.e. permission, but the recommendations of this Technical Report concerning visual design criteria can be equally applicable to perception problems in other areas in which graphic symbols are employed as the means of communication.

## 2. References

| | |
|---|---|
| ISO/R.408* | Safety colours |
| ISO/R.557* | Symbols, dimensions and layout for safety signs |
| ISO 3461** | Graphic symbols - General principles for presentation |
| ISO 4196*** | Graphic symbols - Guide to the use of arrows |
| ISO 7000*** | Graphic symbols - Index |
| ISO 7001 | Public Information Symbols |

* To be replaced by ISO 3864, Safety Colours and Safety Signs (in preparation)

** At present in revision

*** At present in preparation

## 3. Abbreviations and definitions

3 .1 **Algebraic symbols.** The definitions for the algebraic symbols used in the formulae adopted in this Technical Report, are as follows:

**3.1.1** $md$ represents the linear dimension of the smallest significant detail in the graphic symbol (see 5.8)

**3.1.2** $ml$ represents the minimum line thickness for the articulation of details in a symbol (see 5.8)

**3.1.3** $dis$ represents the distance between the symbol and the internal edge of the symbol enclosure (see 6.1)

**3.1.4** $s$ represents the linear dimension of the symbol as defined by the corner marks in the guide-line examples of ISO 7001 (see Annex A).

**3.1.5** $de$ represents the internal dimension of one side of a diamond enclosure (see 6.2.1).

**3.1.6** $d$ represents the internal diameter of a circular enclosure (see 6.2.2).

**3.1.7** $b$ represents the internal base dimension of an equilateral triangular enclosure (see 6.2.3)

**3.1.8** $D$ represents the viewing distance (i.e. the distance it is anticipated the viewer will be from the sign. See 6.4)

**3.1.9** $X$ represents the displacement of the centre of the sign from the central line of vision, measured at right angles to the central line of vision (see 6.4)

**3.2 Definitions.** For the purposes of this Technical Report the following definitions shall apply:

**3.2.1 apparent size.** Enclosures or symbols which have different geometric dimensions but which nevertheless are perceived by the eye as being of the same size, are said to have the same "apparent size".

**3.2.2 appropriateness ranking test.** A procedure for placing symbols, designed for a given referent, in decending order of merit according to their considered appropriateness.

**3.2.3 background.** That part of a sign immediately behind a symbol or word. (see Annex B)

**3.2.4 colour code.** Colours used symbolically to represent particular meanings (see ISO/R.408 or ISO 3864).

**3.2.5 comprehension test.** A procedure for elliciting a response from the public which enables measurement of the degree of comprehension of the proposed symbols.

**3.2.6 conspicuity.** The capability of one entity in the visual field to be more easily noticed than any surrounding information.

**3.2.7 detection.** The ability of the visual system to discover the presence of stimuli in the visual field.

**3.2.8 displacement.** Distance between the centre of a symbol located in a public place and the central line of the normal direction of vision of the user, measured at a right angle to that central line of vision (see 6.4)

**3.2.9 enclosure.** That part of the sign which encloses the symbol (see Annex B).

**3.2.10 field of application.** The context in which the use of a symbol to convey a message is appropriate.

**3.2.11 function.** The purpose of the symbol.

**3.2.12 guide-line example.** A selected graphic interpretation of the standard image content in the form of a symbol as published in ISO 7001.

**3.2.13 image content.** The elements of the symbol and their relative disposition.

**3.2.14 legibility.** The property of characters and symbols which enables one character to be discriminated from another.

**3.2.15 matching test.** A procedure where respondents select from a set of symbols, the symbol which they judge best matches a given referent (see 4.2.2.4)

**3.2.16 negating stroke.** A graphic device in the form of a line intended to negate a symbol's original intended message.

**3.2.17 public information symbol.** A graphic symbol intended to give information to the general public, the understanding of which is not normally dependant on specialist or occupational training.

**3.2.18 referent.** The subject represented by the symbol.

**3.2.19 resolution.** The ability of the visual system to discriminate small details. This ability is affected by several factors, including viewing distance, size of details and the separation between them (see 5.8).

**3.2.20 shape code.** A geometrical shape used symbolically to represent a particular meaning (see ISO 557 or ISO 3864).

**3.2.21 sign.** A configuration of visual elements - symbols, text and other shapes - produced to convey a given message.

**3.2.22 standard image content.** The image content as described in words for each referent, and published in ISO 7001.

**3.2.23 symbol.** A visually perceptible figure, reproduced by means of writing, drawing, printing or other manufacturing technique, intended to convey a particular meaning.

**3.2.24 symbol set.** A related range of symbols, each symbol conforming to the verbal description of the image content, and each symbol relating to a particular area of public interest, e.g. transport, leisure, sport, accommodation etc.

**3.2.25 symbol variants.** Alternative symbol designs for a given referent.

**3.2.26 viewing angle.** The angle formed by the plane of a sign and the central line of vision of an observer (see figure 5).

**3.2.27 visual size** (visual angle). The angle subtended by two lines drawn from the eye of the observer to the two extremes of the longest axis of the symbol (see figure 4).

## 4. Procedures for the development or adoption of public information symbols

**4.1 Adoption.** Before proceeding to the development of a new symbol for a particular function, reference should first be made to ISO 7001 in order to establish that a referent has not already been standardized.

**4.1.1 ISO procedures.** The use of the procedures outlined in Annex 2A of the Directives for the technical work of ISO may also be used to establish whether work has already commenced to standardize a referent for the function required.

### 4.2 Development

**4.2.1 Determination of need.** Before proceeding to develop a symbol for a particular function it should first be clearly established that a graphic symbol to serve that function is definitely needed.

**4.2.2 Design development.** Having established that a need exists for a new symbol to be designed, original designs for a public information symbol should be based on results obtained by following the procedures indicated in figure 1.

**4.2.2.1 Trial designs.** This initial stage involves both the generation of trial designs and the collection of any designs in use for each of the referents under consideration. This preliminary stage will generate many more versions of the symbols than it is possible to test comprehensively, so a limited number of the most appropriate symbols for further investigation are selected using a method called a 'appropriateness ranking test'.

With this limited number of symbol alternatives for a given referent, a Comprehension Test is then conducted to investigate which elements of these symbols are better comprehended in terms of the intended meaning of the given referent.

For this stage of testing and evaluation, not only are symbol variants required for the referent, but a definition of the function of the referent and its field of application is required. These aspects are critical for the testing technique. Only in this way can any sensible and useful interpretation be made of the Comprehension Test data.

At this stage, no one symbol variant is being tested with a view to adoption, but rather, the symbols under test will allow the selection of the pictorial elements which are likely to make a useful symbol in practice. The results of the Comprehension Test when interpreted in this way, lead to a verbal description of the image content of the symbol. This then becomes the standard for the referent.

**4.2.2.2 Poor response.** If the level of comprehension of the proposed symbol is unsatisfactory, new trial designs are initiated or a re-definition of the scope or field of application of the symbol is attempted. Thereafter, the procedures indicated in figure 1 are repeated as required.

**4.2.2.3 Symbol sets.** If the level of recognition of the proposed symbols is satisfactory, prepare verbal descriptions of the image content and proceed to prepare the symbol set.

Individual symbols should be designed as elements of a system. It should be borne in mind that the communicative power of an individual symbol is dependant upon a certain degree of consistency with other components of the set and also upon a certain degree of distinctiveness. Distinctiveness of an individual symbol within a set prevents confusion. Also, a set of symbols having a consistency of design reinforces the possibility of detection of the individual symbols in a complex environment.

**4.2.2.4 Matching test.** The purpose of the matching test is to determine how well the symbols work as a related set and whether any aspect of their visual design leads to confusion. Results from the matching test are then used to modify the previously derived verbal description of the image content so as to avoid confusion in practice.

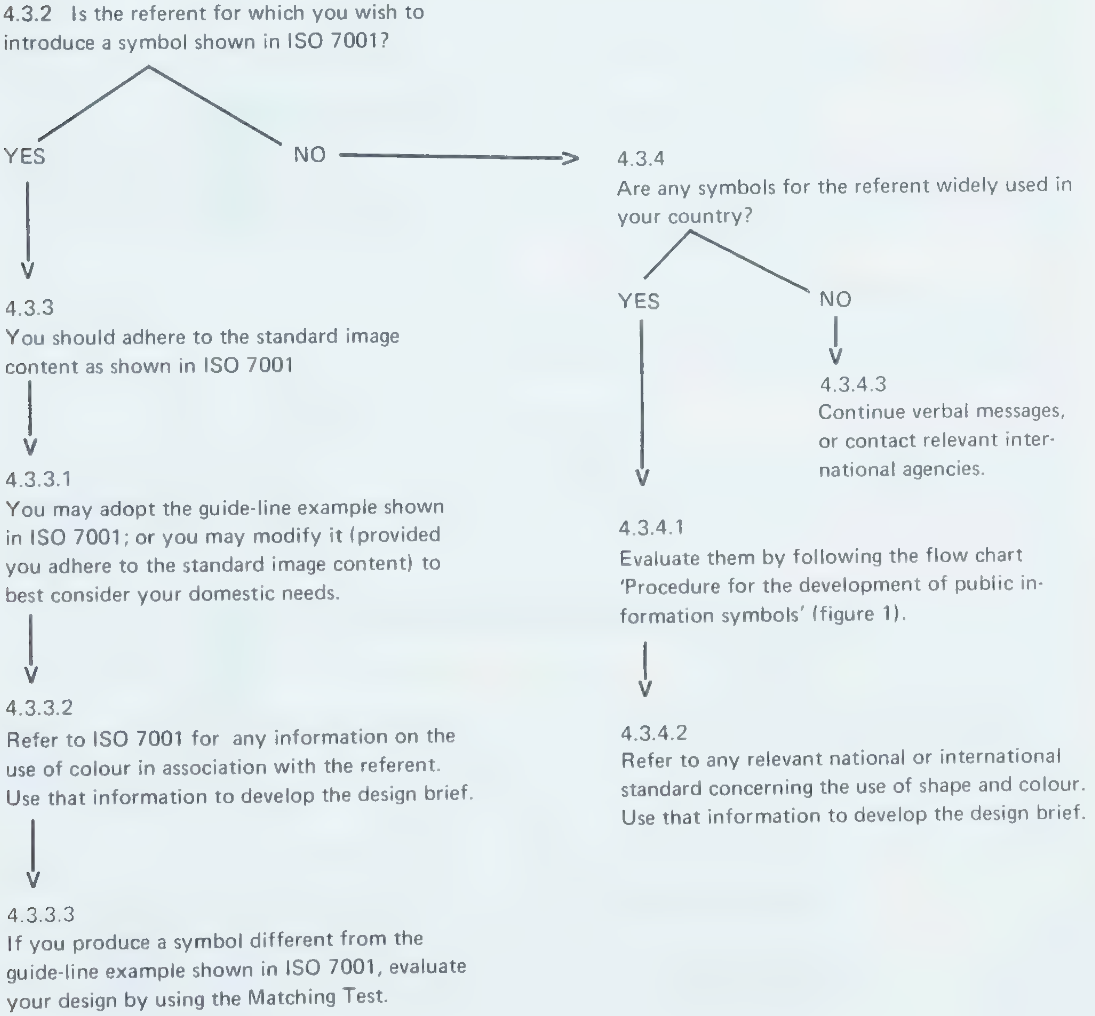
**4.2.2.5 Standard image content and guide-line example.** The ISO Standard for a given referent comprises three elements, viz:

(a) the function (see 3.2.11)
(b) the field of application (see 3.2.10)
(c) the standard image content (see 3.2.22)

It should be noted that it is not the graphic form as such that is being standardized but the image content. In this way it is hoped that flexibility within the standard will be available for cultural influences and design styles in different countries. The guide-line examples are provided merely to guide the users of the standard in the interpretation of the standard image content. It is not essential to use the guide-line example in order to conform to the standard, although its use is encouraged (see Annex A).

### 4.3 Procedural guidelines

4.3.1 Determine the need for a symbol



4.3.2 Is the referent for which you wish to introduce a symbol shown in ISO 7001?

4.3.3
You should adhere to the standard image content as shown in ISO 7001

4.3.3.1
You may adopt the guide-line example shown in ISO 7001; or you may modify it (provided you adhere to the standard image content) to best consider your domestic needs.

4.3.3.2
Refer to ISO 7001 for any information on the use of colour in association with the referent. Use that information to develop the design brief.

4.3.3.3
If you produce a symbol different from the guide-line example shown in ISO 7001, evaluate your design by using the Matching Test.

4.3.4
Are any symbols for the referent widely used in your country?

4.3.4.1
Evaluate them by following the flow chart 'Procedure for the development of public information symbols' (figure 1).

4.3.4.2
Refer to any relevant national or international standard concerning the use of shape and colour. Use that information to develop the design brief.

4.3.4.3
Continue verbal messages, or contact relevant international agencies.

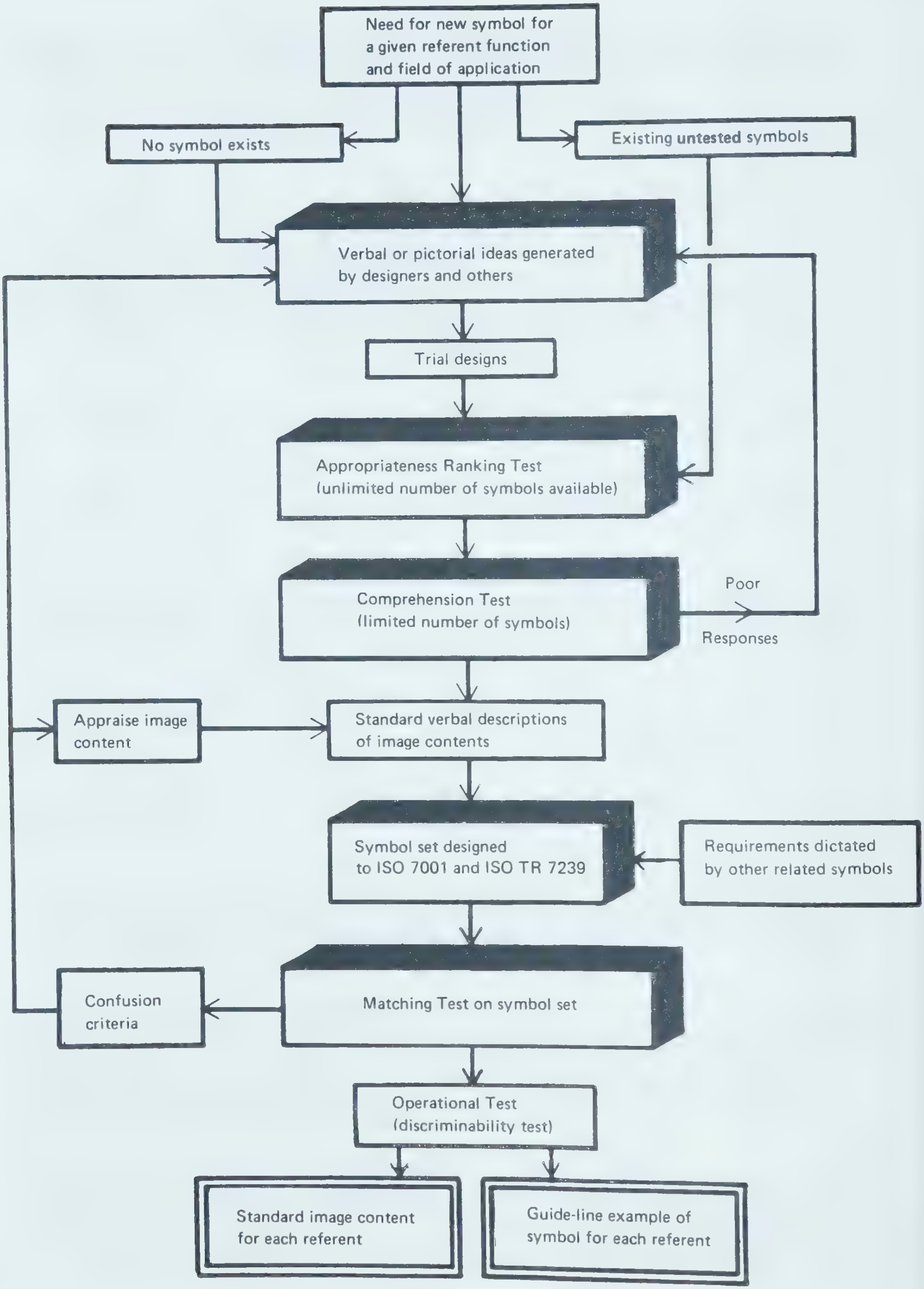

Need for new symbol for a given referent function and field of application
No symbol exists
Existing untested symbols
Verbal or pictorial ideas generated by designers and others
Trial designs
Appropriateness Ranking Test (unlimited number of symbols available)
Comprehension Test (limited number of symbols)
Poor
Responses
Appraise image content
Standard verbal descriptions of image contents
Symbol set designed to ISO 7001 and ISO TR 7239
Requirements dictated by other related symbols
Confusion criteria
Matching Test on symbol set
Operational Test (discriminability test)
Standard image content for each referent
Guide-line example of symbol for each referent

Figure 1. *Procedure for the development of public information symbols*

## 5. Visual design criteria for the development of public information symbols

**5.1 General.** The widely differing characteristics of the environments in which public information symbols are used prevent the development of fixed recommendations. It is for the professional designers in visual communication to interpret and apply the information in this Technical Report after appropriate assessment of specific environments.

The following recommendations apply to symbols placed in a vertical plane and not using reflective material or internally illuminated signs.

**5.2 Construction of a symbol.** The use of grids may help to maintain similar apparent size and consistency within sets of symbols. (See 4.2.2.3, concerning the design of sets of symbols). The variety of visual components which must be used in public information symbols however preclude the use of restrictive geometric patterns. No symbol design should be forced to fit within a basic grid to the detriment of its function to communicate.

**5.3 Proportions of a symbol.** Long, narrow forms are not as easily perceived as forms in which height and width are similar. A height to width ratio of 1:4 is the maximum recommended for use in public information symbols.

**Note.** This refers to the symbol only and not to other components such as the negating stroke or an enclosure line.

**5.4 Symmetry.** Symmetrical forms are more easily discriminated. Symbols therefore need to be designed with left/right symmetry whenever convenient. Not all symbols need to be symmetrical. Some individual referents may require a symmetrical symbol for effective design, while others may not.

**5.5 Directional characteristics.** When symbols having explicit or implicit directional characteristics are combined with a directional arrow, directional conflict should be avoided, by appropriate lateral reversal of the symbol. The design of any such symbol should be such that reversal in this manner is possible.

**5.6 Solid or outline forms.** Silhouette is more effective than outline. Solid forms therefore should be used in preference.

If however, symbols in outline form must be used, the interior of the symbol should differ in colour or in pattern from that of the background.

**5.7 Number of details.** The ratio of perimeter to area of the symbol should be minimised, as this, in general, tends to improve the degree of discrimination of the form. Only details that contribute to better comprehension should be included. Unnecessary details and elements that are dependant upon fashion and foreseeable changes in the appearance of the object portrayed should be avoided.

**5.8 Minimum dimension of significant details** ( *md* ). The recommendation made here is based on extrapolation of research on visual acuity and letter form legibility. The recommended values are to establish **reliable** legibility and therefore exceed **threshold** values.

The limit of resolving power of the eye adopted here is based on the perception of the Snellen letter 'E' used for visual acuity measurements. Subjects with normal vision can reliably recognise letter 'E' when it subtends a visual angle of 5 minutes (see 3.2.27). Each stroke or separating space subtends an angle of 1 minute i.e. 0.3 mm for each metre of viewing distance.

To ensure reliable recognition this threshold value has been multiplied by a safety factor of 3.

Minimum significant detail within a symbol should therefore be calculated as follows:

**1 mm of significant detail** (*md*) **for every metre of viewing distance** (*D*)

or $$md \geqslant \frac{D}{1000}$$

Note that the dimensions quoted in this section are rounded up to facilitate their memorisation and use.

**5.8.1 Minimum line thickness for significant detail** (*ml*) Where there is no interference from other visual elements, the line thickness may be calculated using a safety factor of 1.5.

Minimum line thickness for significant detail in such cases should be calculated as follows:

**0.5 mm of line thickness (*ml*) for every metre of viewing distance (*D*)**

or $$ml \geqslant \frac{D}{2000}$$

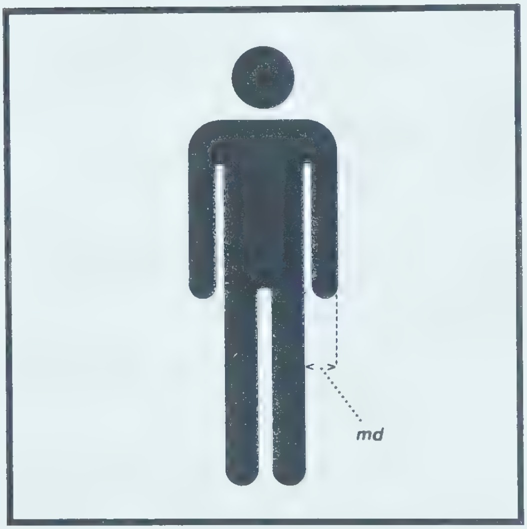


Figure 2. *Example of significant detail (md)*

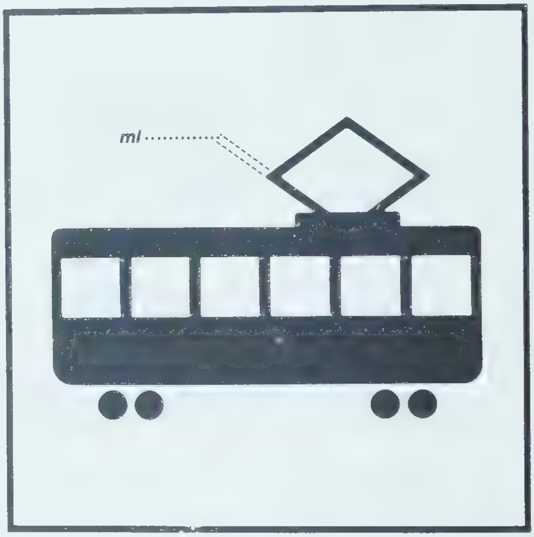


Figure 3. *Example of line thickness for significant detail (ml)*

*(Significant details are those that contribute to the comprehensibility of a symbol)*

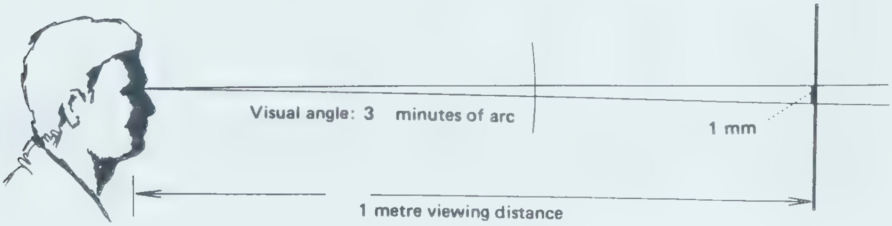


Figure 4. *Visual angle ( Illustration not drawn to scale ).*

**5.9 Reproduction/reduction.** Care should be taken at the design stage to produce originals suitable for significant reduction in size.

Faithful reproduction without loss of definition or impairment of recognition is dependant upon the reproduction process employed in the making of the reduction. Another means of overcoming or avoiding reduction problems is by designing a simplified version of the original, specifically suited to extensive reduction. This version should, nonetheless, still comply with the standard image content.

**5.10 Negation.** The comprehension of verbally presented negative information is more difficult than that of positive information of a similar form. There is as yet no experimental data that suggests this is also true when the information is presented as a graphic symbol.

However, on the basis of the experience related to verbal communication, it is recommended that, if a concept can be conveyed either by a positive or a negative command, the positive message should be used. Whenever possible, however, both negative and positive messages should be tested before adopting the positive message as being more effective.

**5.11 Combination of symbols** (composite symbols). In order to present certain concepts it may be necessary to combine symbols. Such composite symbols, even where based on standardised symbols, should be considered as new graphic symbols which are subject to the same testing as any other symbol. Composite symbols should be formed from as few component elements as possible.

**5.12 Interaction between symbols.** Display of grouped symbols occurs frequently within a sign system. This should be taken into account at the design stage since there is often interaction between adjacent symbols. When designing the symbols, the designer should therefore bear in mind that they will be used in association with one another and grouped to form composite displays.

**5.13 Apparent size** (see 3.2.1) Consistency in the apparent size of symbols within a set (excluding the enclosure), cannot always be achieved by matching the longest dimension of individual symbols. In most cases the dimensions will have to be modified to compensate for any apparent perceptual inconsistency.

**5.14 Size of symbol.** Symbols should normally be constructed within square enclosures. For the purposes of this Technical Report, and in line with ISO 7001, the internal edge of the square enclosure is the **size of the symbol.** The square enclosure should be indicated in the final design by corner marks (see Annex A). (For non-square enclosures see 6.2)

## 6. Implementation

**6.1 Interaction between symbols and enclosures.** (see 3.1.3) The geometric shape on which symbols will eventually appear, and the effect of a negating stroke (if required) should be considered when designing the symbol.

Normally, symbols for public information should be presented within square enclosures. In appropriate cases however, diamond, circular and triangular enclosures may be used. For very small reproduction however, such as for timetables, maps, guides, etc, it is advisable to omit the enclosure.

The distance (*dis*) between the symbol and the internal edge of the enclosure should be greater than or equal to 1.5 times the minimum dimension for significant details (see 5.8) i.e.

$$dis \geqslant md \times 1.5$$

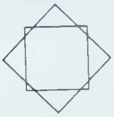
When any component of the symbol approaches and is parallel to the internal edge of the enclosure, the distance that separates them should be increased to at least 2.5 times the minimum dimension for significant details, i.e.

$$dis \geqslant md \times 2.5$$

The corners of a square enclosure may be rounded without changing the nominal size of the square, provided the modification does not conflict with the recommendation relating to the distance between symbol and enclosure.

**6.2 Enclosure shapes.** Care should be taken on the choice of enclosure shapes as they may have different national significance, (see ISO/R 408 and ISO/R 557 or ISO 3864). In those cases where it is desirable to maintain the same apparent size of symbol and enclosure, the actual size of enclosure may need to be larger than the equivalent square enclosure. The size of each enclosure shape should be maintained constant within a set of symbols.

**6.2.1 Diamond enclosures.** (see 3.1.4 and 3.1.5). A diamond enclosure (*de*) is a square whose sides are at 45° to t horizontal. It is recommended that diamond enclosures be the same size as square enclosures. As a general rule symbols which are designed to fit within a square enclosure will normally fit, without modification, into a diamond enclosure of the same size. Exceptionally however, it may be necessary, in order to permit the symbol size to be maintained, to enlarge the size of the diamond enclosure. In such cases it is recommended that the size of the diamond enclosure be not more than 1.2 times the size of the square enclosure, or, in other words, not more than 1.2 times the size ( *s* ) of the symbol as defined in 5.14, i.e.

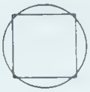


$de \leqslant$ 1.2 times the length of the side of a square enclosure.

or $de \leqslant 1.2\ s$

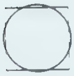
**6.2.2 Circular enclosures.** (see 3.1.6) If a symbol is to fit within a circular enclosure whose diameter (*d*) is equal to the side of a square enclosure, it will usually be necessary to reduce the size of the symbol.

In order to permit the symbol size to be maintained without drastically changing the size of the enclosures it is recommended that the diameter of the circular enclosure be not more than 1.3 times the length of the side of the square enclosure, i.e.



$$d \leqslant 1.3\ s$$

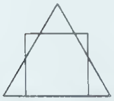
Where it is necessary for a circular enclosure to have a similar apparent height to the square enclosure, it is recommended that the internal diameter of the enclosure be 1.04 times the length of the side of a square enclosure, i.e.



$$d = 1.04\ s$$

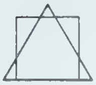
**6.2.3 Triangular enclosures** (see 3.1.7). If a symbol is to fit within a triangular enclosure whose base (*b*) dimension is equal to the length of a side of a square enclosure, it will usually be necessary to reduce the size of the symbol.

In order to permit the symbol size to be maintained, it is recommended that the length of the base dimension of the triangle be not more than 1.7 times the length of the side of the square enclosure, i.e.



$$b \leqslant 1.7\ s$$

If it is desirable to maintain the same apparent size of enclosures, the base dimension of the triangle should be approximately 1.4 times the length of the side of the square enclosure, i.e.



$$b = 1.4\ s$$

**6.3 Viewing angle** (see 3.2.26). Viewing angles should be as near to 90° as possible (see figure 5).

When the viewing angles are less than 45°, the designer in charge of implementation should assess the local situation and decide whether changes in the proportions of symbols and enclosures would improve detection and recognition.

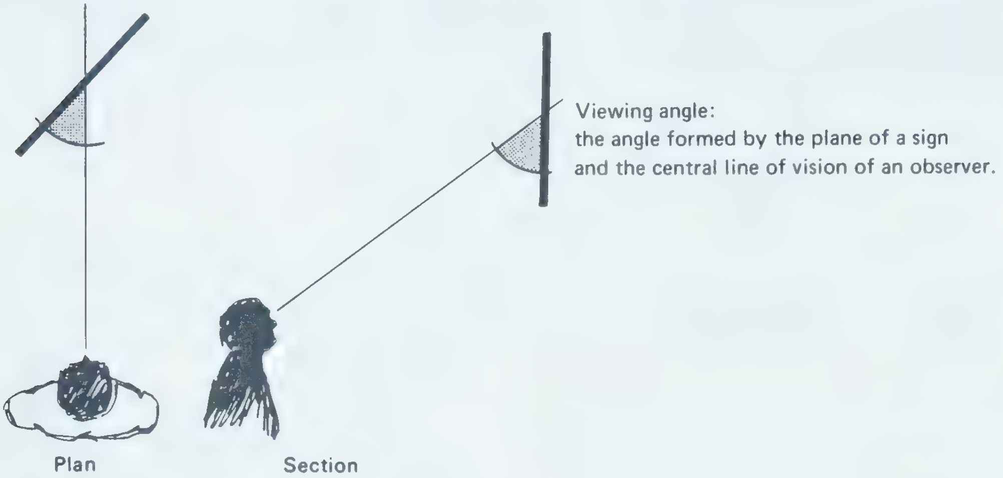

Viewing angle:
the angle formed by the plane of a sign
and the central line of vision of an observer.
Plan
Section

Figure 5. *Viewing angle*

**6.4 Viewing distance/symbol size/displacement.** Viewing distance and symbol size are interdependent factors which require careful consideration during implementation. In a given set of symbols, individual symbols may have different optimum viewing distances. The optimum viewing distance for any set will be determined by the symbols with the shortest viewing distance.

The size of a symbol in a specific location should be determined by inter-relating viewing distance ($D$) (see 3.1.8) and displacement ($X$) (3.1.9 and 3.2.8)

**6.4.1 Maximum recommended displacement.** The maximum recommended amount of displacement for normal viewing conditions may be calculated as:

**250 mm of displacement for every metre of viewing distance,** or

$$X \leq \frac{D}{4}$$

This provides an angle of displacement at the eye of the observer of approximately 15° (See figure 6).

**6.4.2 Displacement for optimum conspicuity.** In cases where immediate detection of a symbol is critical, e.g. hazard warning, it is advisable to limit the angle of displacement to approximately 5°. This may be obtained by applying the following formula:

**80 mm of displacement for every metre of viewing distance,** or

$$X \leq \frac{D}{12}$$

It is recommended that in all circumstances where a symbol must be placed below eye level, whenever possible the angle of displacement be not greater than 5°.

### 6.4.3 Symbol size

**6.4.3.1 Symbol size to ensure conspicuity.** The recommendation made here is based upon extrapolation of research on detection and resolution thresholds. In order to discriminate a specific shape in peripheral vision at 15° of displacement, this shape has to subtend a visual angle of 26′ (approximately 8 mm in size, at 240 mm displacement for every metre of viewing distance). This threshold value has been multiplied here by a factor of 3 to ensure **reliable** conspicuity. According to the above, the determination of symbol size in relation to viewing distance should therefore be calculated on the basis of:

**25 mm of symbol size ($s$) for every metre of viewing distance ($D$), i.e.**

$$s = \frac{25\,D}{1000}$$

This recommendation is aimed at ensuring conspicuity. In order to relate this recommendation to the minimum dimension of significant detail refer to 5.8. On the basis of the recommendations established in 5.8 the minimum dimension of significant details will be 1/25 of the size of the symbol ( $md = s \div 25$ ).

The minimum line thickness recommended (see 5.8.1) will therefore be 1/50 of the size of the symbol ($ml = s \div 50$ ).

The recommended size of a symbol is based upon the assumption that it will not be required to function outside a 15° angular displacement from the central line of the normal direction of vision of the users. Designers should consider the 15° angular displacement assumption when placing symbols designed to these recommendations, because symbols would need to be unacceptably large to ensure conspicuity outside this range.

**6.4.3.2 Symbol size to satisfy legibility.** When conspicuity is not a concern the size of the symbol can be smaller and still maintain good legibility. In this case the following formula for determination of symbol size in relation to viewing distance should be applied:

**12 mm of symbol size ($s$) for every metre of viewing distance ($D$), i.e.**

$$s = \frac{12\,D}{1000}$$

In order to relate this recommendation to the minimum dimension for significant detail (5.8) the following formula should be applied:

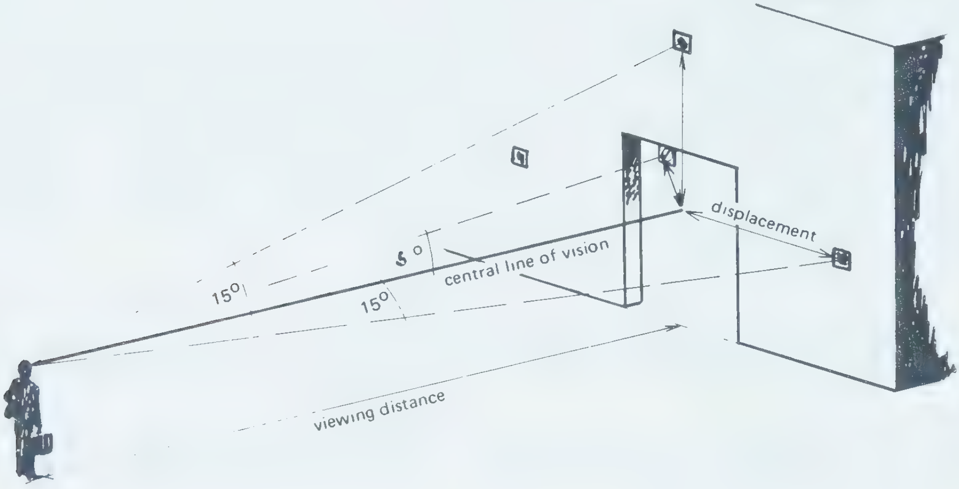
$$md = \frac{s}{12}$$

In order to relate this recommendation to the minimum line thickness (5.8.1), the following formula should be applied:

$$ml = \frac{s}{24}$$

When the light level in a particular location is low, or when the local environment is particularly complex, consideration should be given to increasing the size of symbols or reducing the angle of displacement.

In cases where immediate detection of a symbol is critical, e.g. hazard warning, or in cases where the location of the symbol is below normal eye level and may consequently be obscured by traffic, it may be necessary to increase the visual size.



**Minimum size of the symbol to ensure conspicuity:**
25 mm for every metre of viewing distance.

**Minimum size of the symbol to satisfy legibility:**
12 mm for every metre of viewing distance.

**Maximum displacement for non-critical symbols:**
250 mm for every metre of viewing distance.

**Maximum displacement for hazard-related or other critical symbols:**
80 mm for every metre of viewing distance.

Figure 6. *Viewing distance, symbol size and displacement from the central line of the normal direction of vision*

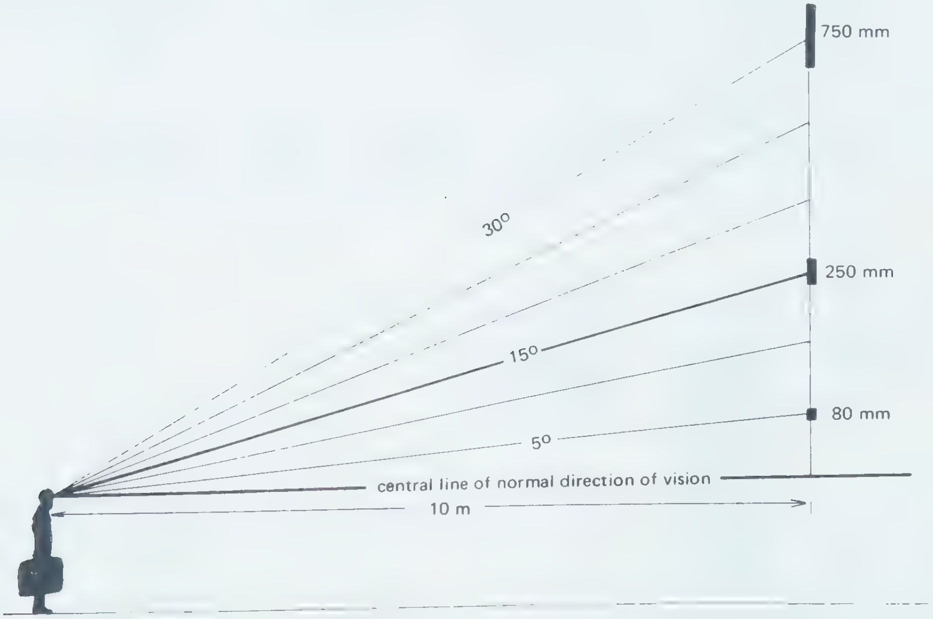


Figure 7. *Size increase required by displacement (X)*
*A symbol 80 mm in size at 5° displacement, would have to be 250 mm in size at 15° displacement and 750 mm in size at 30° displacement to maintain similar conspicuity.*

### 6.4.4 Summary of recommendations

Minimum line thickness → 0.5 mm for every metre of viewing distance

Minimum dimension for significant detail → 1 mm for every metre of viewing distance

Symbol size to ensure legibility → 12 mm for every metre of viewing distance

Symbol size to ensure conspicuity → 25 mm for every metre of viewing distance

Maximum displacement → 250 mm for every metre of viewing distance

(see Annex C for example of sign development)

**6.5 Orientation of symbols.** When the meaning of a graphic symbol depends on its orientation or position this should be clearly stated. The location of such symbols in rotating devices is particularly sensitive in this respect.

**6.6 Distance between symbols.** The distance between symbols in a composite information panel formed by two or more symbols should be sufficient to allow clear separation between individual symbols. As a guide, the space between symbols should be twice that between symbols and their enclosures, i.e. 2 *dis* (see 3.1.3).

**6.7 Symbol/text interaction.** The proximity of a symbol and its associated text will affect the extent to which these two elements are perceived as a single unit.

In complex sign arrangements where symbols are associated with successive lines of text, the space between consecutive lines of text can affect the visual association of symbol and text. In such cases the text relevant to a particular symbol should be placed unambiguously in association with the corresponding symbol.

**6.8 Symbol/text/arrow interaction.** Where a directional arrow is associated with text, the arrow should be in close proximity to the text.
If a symbol is used in conjunction with the arrow, the symbol should be placed between the arrow and the text. Arrows pointing up, down or to the left should precede the text. Arrows pointing to the right should follow the text and the text itself should be arranged in that direction. See figure 8 and ISO 4196.

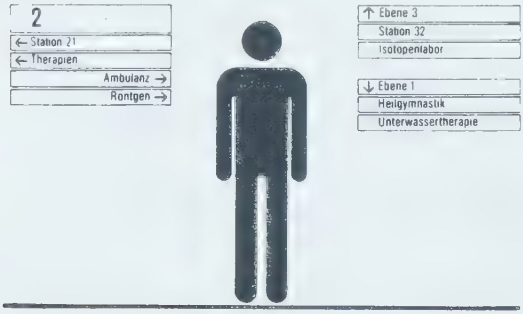


Figure 8. *Example of relative positioning of text and arrows*

**6.9 Public information symbols and corporate identities.** It is recommended that corporate identity symbols should be visually separated from public information symbols to avoid confusion.

**6.10 Tonal contrast.** Changes in figure/ground tonal relation should be avoided within a set of symbols and within an information panel.

The recommendations in this Technical Report apply to dark symbols on a light background without internal illumination. Where the tonal contrast differs from this, i.e. a white symbol on a dark background, it may be necessary to prepare the design to compensate optical distortions introduced by these tonal changes.

Internally illuminated or reflective signs may also cause optical inconsistencies. Based on the analogous case of type design it may be necessary to compensate for these optical inconsistencies by allowing for a factor of up to 20 % in the size of some details, i.e. the actual width of illuminated strokes should be reduced by that percentage.

The high level of light in internally illuminated signs might improve conspicuity but impair legibility.

Where symbols appear on reflective or internally illuminated signs that are affected by both natural and artificial lighting conditions, extreme care should be taken to ensure consistent legibility under these different lighting conditions.

**6.11 Use of colour and useful life of a sign.** In general, the graphic form of a symbol reproduced in black and white will be sufficient for its identification.

Attention is drawn to the fact that certain colour combinations have specific meanings in some countries and this should be taken into account to avoid the introduction of ambiguities (see ISO 3864 and appropriate single sheet of ISO 7001).

It should also be borne in mind that some colours are more susceptible than others to fading, in both natural and artificial light. This may reduce the useful life of a sign and it is recommended that the sign be replaced when the original tonal contrast is impaired to a degree affecting the conspicuity and legibility of a sign.

## Annex A. Specimen single sheet of ISO 7001 *( The example has been slightly reduced for this reproduction )*

ISO 7001
Sheet No. : 004

## 1 Standard[1]

**Public information symbol** :
Tram (streetcar)

**Standard image content** :
Electric tram (streetcar) in side view

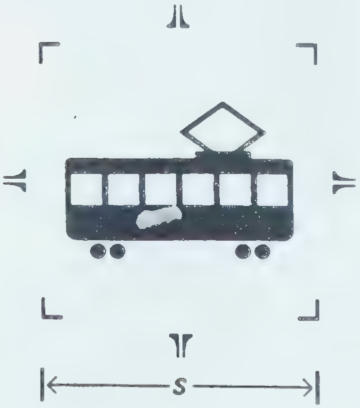
**Function** :
To signify transport facility by tram

**Field(s) of application** :
Buildings, services and public places
Maps, guides
Timetables

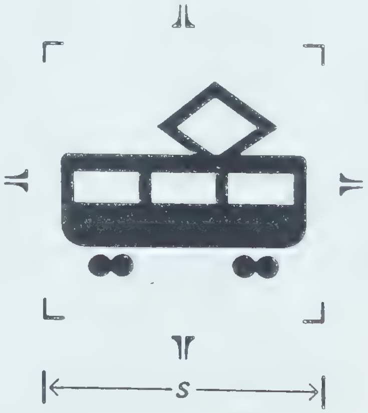
## 2 Additional information for guidance

This is not a standard but an example, the use of which is encouraged

**Guide-line example** :
($s$ = 45 mm)
Size limits for the design below
Minimum : $s$ = 9 mm
Maximum : no limit



**Guide-line example, simplified for small-scale reproduction** ($s$ = 45 mm) :
Size limits for the design below :
Minimum : $s$ = 4 mm
Maximum : $s$ = 9 mm



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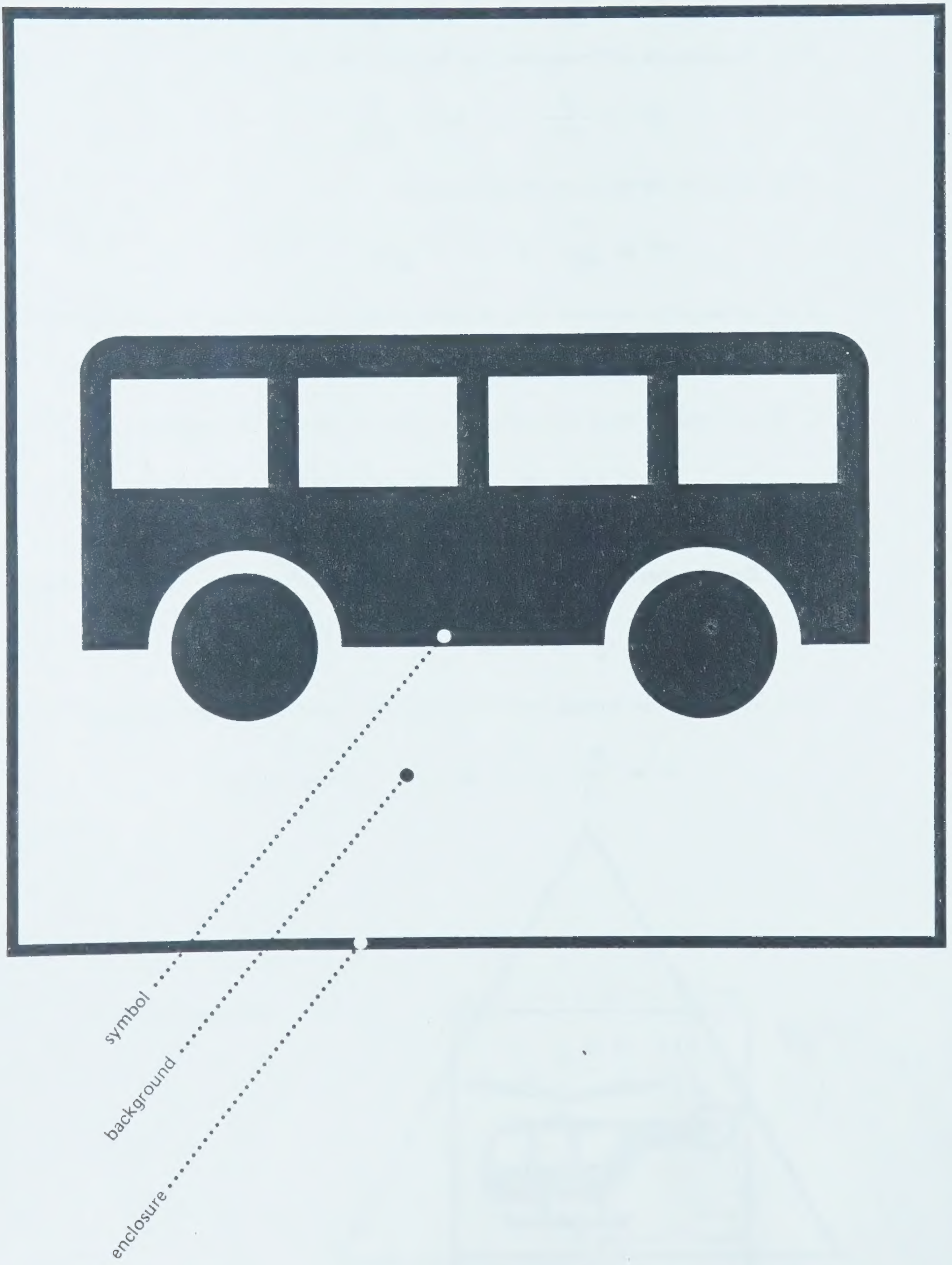
[1] This sheet should be used in conjunction with the "Introduction" and ISO/TR 7239.


symbol
background
enclosure

C.1 Given a viewing distance ($D$) of 4 metres, to design a conspicuous sign required in a triangular enclosure, follow the procedures set out below:

C.1.1 Calculate the symbol size ($s$)

$$s = \frac{25\,D}{1000} \quad \text{or} \quad s = \frac{25 \times 4}{1000} = 100 \text{ mm}$$

C.1.2 Calculate the minimum dimension for significant detail ($md$)

$$md \geqslant \frac{D}{1000} \quad \text{or} \quad md \geqslant \frac{4}{1000} = 4 \text{ mm}$$

C.1.3 Calculate the minimum line thickness ($ml$)

$$ml \geqslant \frac{D}{2000} \quad \text{or} \quad ml \geqslant \frac{4}{2000} = 2 \text{ mm}$$

C.1.4 Calculate the minimum distance between edge of symbol and inner edge of enclosure ($dis$)

$$dis \geqslant 1.5\,md = 1.5 \times 4 = 6 \text{ mm}$$

C.1.5 Calculate the length of inner edge of triangular enclosure ($b$) necessary to maintain the symbol size

$$b \leqslant 1.7\,s \quad \text{or} \quad 1.7 \times 100 = 170 \text{ mm}$$

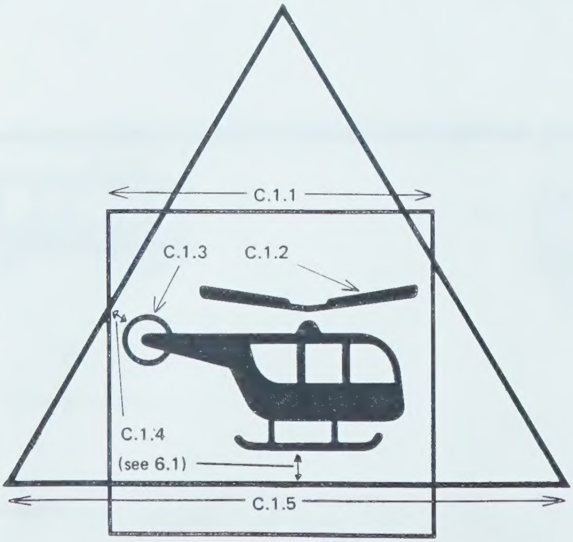
C.1.6 Produce sign

C.1.7 Calculate maximum displacement from central line of normal direction of vision of the public ($X$)

$$X \leqslant \frac{D}{4} \quad \text{or} \quad X \leqslant \frac{4}{4} = 1 \text{ metre}$$

C.1.8 If it is a critical symbol, calculate displacement to obtain optimum conspicuity, i.e.

$$X \leqslant \frac{D}{12} \quad \text{or} \quad X \leqslant \frac{4}{12} = 33 \text{ centimetres}$$



Approximate scale 1 : 2